ELECTRICAL TIMES

THURSDAY
25 OCT.
1951
NINEPENCE

'ENGLISH ELECTRIC'

fusegear

Higher Short-Circuit "Making" Capacity—50 MVA

Previously tested at 25 MVA, 'ENGLISH ELECTRIC' combination fuse switches of all ratings of the new standard shrouded pattern have now successfully passed 3-phase 440 volts short-circuit "making" tests at 35 MVA and 50 MVA.

The ENGLISH ELECTRIC Company Limited

Queens House, Kingsway, London, W.C.2 · Fusegear Works: East Lancashire Road, Liverpool 10

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

A.E.

a certified product

the

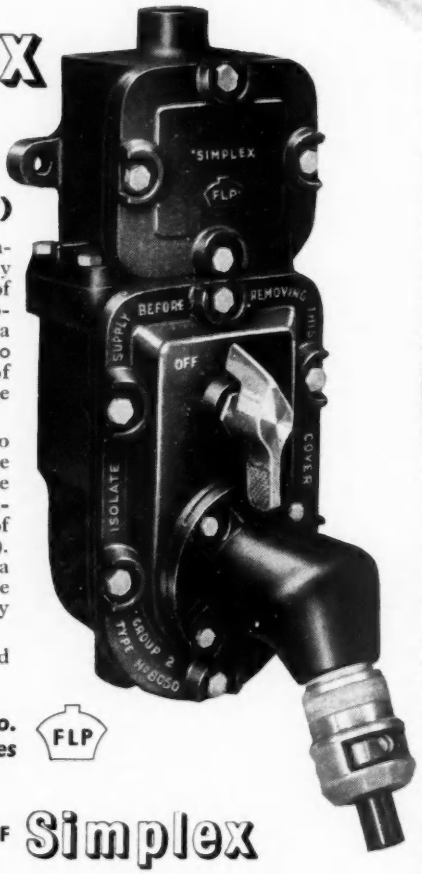
Simplex

flameproof switch socket and plug (A.C. only)

This modern flameproof switch-socket and plug complies fully with B.S.229/46 and Code of Practice 1003. It has been produced to meet the need of a unit capable of supplying 250 volt apparatus by means of screened trailing cables of the heavy T.R.S. type

Great care has been taken to ensure maximum safety. The construction is robust, and the plug pins are skirted. An important feature is the form of cord grip (patent applied for). The switch-socket includes a slow-break 15-amp Double Pole Switch and the plug is fully interlocked.

Standard finish—black stoved enamel or galvanised



M. of F. & P. Certificate No. 2699 covering Group 2 gases

FLP

MADE BY THE HOUSE OF **Simplex**

Simplex Electric Company Limited
Oldbury Birmingham and Branches

A COMPANY

Coolicon REG. *is in the news!*

When you see them you'll want them

Here's the bright answer to your need for better lighting! COOLICON Shades, in Plastic, with white or coloured galleries, or in Metal. As serviceable as they're smart—as efficient as they're economical. The maker's name guarantees the quality.

BENJAMIN Coolicon REG. SHADES

Ask to see one illuminated in your local Electric Suppliers Show

THE BENJAMIN ELECTRIC Brantwood Road, Tottenham, London, N17

Bolton
THE DAILY MAIL
Nottingham Evening Post
Telegraph & Argus
The Coventry Evening Telegraph
Leicester Mercury
BRISTOL EVENING POST
Express and Star
Bath & Wilts Chronicle & Herald
Huddersfield Daily Courier AND Advertiser
The Press

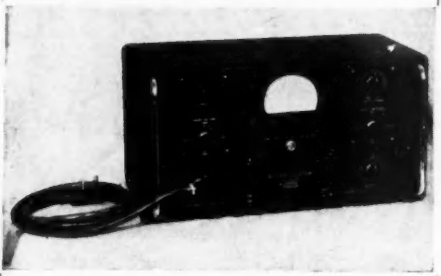
This is just one of the COOLICON advertisements, appearing regularly in newspapers and magazines throughout the country. Stock up with COOLICONS NOW, in readiness for the inevitable demand. The Range comprises 9″ or 11″. All Plastic models (galleries in black, green, blue or white) and an all-metal model, 9″ or 11″ vitreous enamelled green outside and white inside. Sales Aids available.

BENJAMIN REG.

THE BENJAMIN ELECTRIC LTD.
Brantwood Road, Tottenham, London, N.17
Telephone: TOTtenham 5252 (5 lines)

A

GENERATOR



- Cable Fault Location
- Wire Identification
- Depth Measurement
- Pipe Line Tracing
- Cable Routing

RECEIVER

The most modern, sensitive and versatile Induction Tracing Equipment

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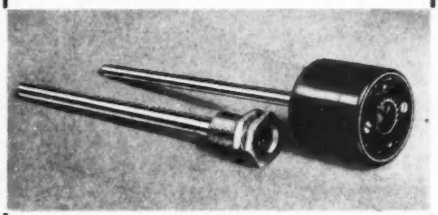
IMMERSION THERMOSTATS

for all liquids

COMPLYING FULLY TO THE REQUIREMENTS OF B.S.S.1555 FOR USE IN ELECTRIC STORAGE WATER HEATERS, IMMERSION HEATERS, CIRCULATORS, ETC., ETC.

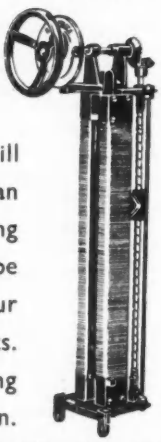
Standard Length Immersed 7", 11" and 18"
Rating 15 and 20 amps. A.C.



PROCESS CONTROL GEAR LTD.
56 Victoria Street, St. Albans, Herts.
ST. ALBANS 2030 PROCONGEAR ST. ALBANS

SLIDING **RESISTANCES**

for all purposes



At a price you will approve, CRESSALL can supply you with a Sliding Resistance of the type and size to meet your particular requirements. Make a point of getting in touch with us soon.

CRESSALL

registered Trade Name of—
The CRESSALL MANUFACTURING CO., LTD.,
Tower Street, Birmingham 19.
Telephone: ASTon Cross 2666 (3 lines)
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McKECHNIE
metal technique

BRASS & BRONZE
EXTRUSIONS & STAMPINGS

McKechnie in miniature

The overall diameter of some of these Morganite Potentiometers is just over one inch, so you can well understand how essential it is for the brass and bronze parts made from McKechnie extruded rod to keep their place and get on with the job quietly. We sell rather more tonnage when a bank has a new grille, or when main line expresses are built, but we are just as proud of the big things that we do in small compass. McKechnie metal technique is ever at the Service of Industry. For details please write to 14 Berkeley Street, London, W.1.

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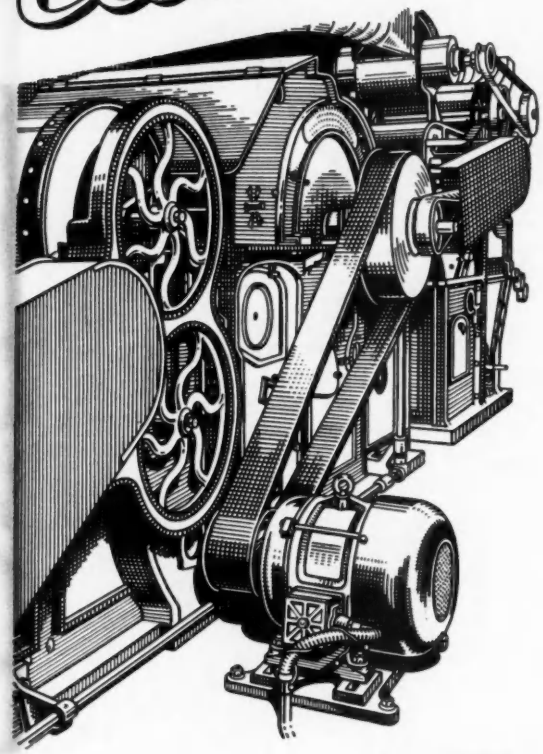
Metal Works : Rotton Park Street, Birmingham 16.
Branch Offices : London, Leeds, Manchester, Newcastle-on-Tyne.
Solder Works : Stratford, London E.15.
Copper Sulphate and Lithopone Works : Widnes, Lancs.
Enquiries for Lithopone and Solder to : 14 Berkeley Street, London W.1.
South African Works : McKechnie Brothers S.A. (Pty.) Ltd., P.O. Box No. 382, Germiston, S.A.

Brook Electric Motors...

Totally Enclosed Surface Cooled Type



●

Dirt, fluff, moisture or chippings cannot enter the sealed casing of the motor which is cooled by an external fan.

●

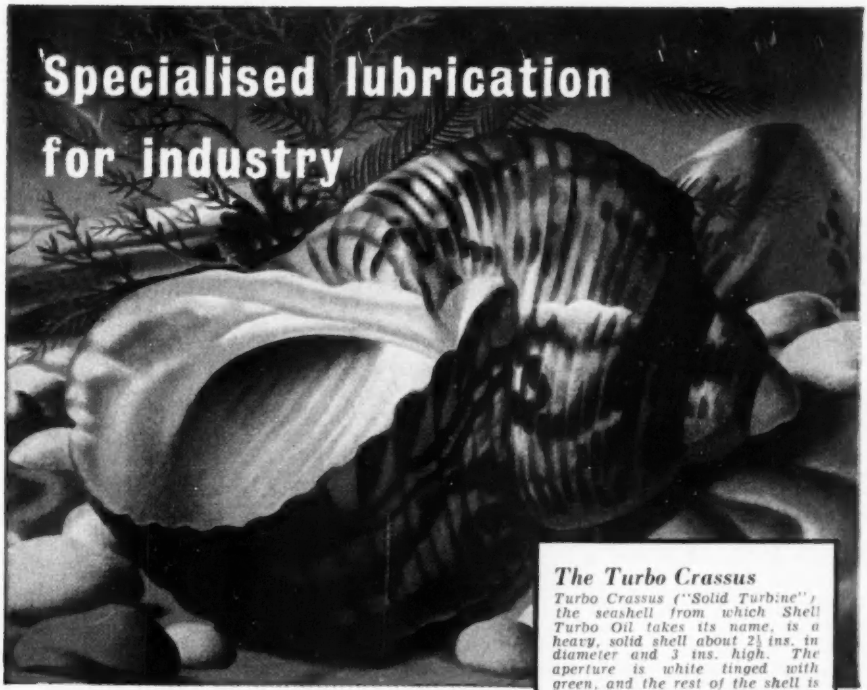
Details can be obtained from BROOK branches.

●

May we advise on your next installation.

BROOK MOTORS Ltd
HUDDERSFIELD
ENGLAND

I. K. L. 194



The Turbo Crassus

Turbo Crassus ("Solid Turbine"), the seashell from which Shell Turbo Oil takes its name, is a heavy, solid shell about 2½ ins. in diameter and 3 ins. high. The aperture is white tinged with green, and the rest of the shell is dirty white or greenish, with angular black or brown patches on the ribs. Found off the coasts of North Australia and New Caledonia

SHELL TURBO OIL

SHELL TURBO OILS are highly refined oils containing anti-oxidant and anti-rust additives. They separate readily from water during prolonged service and have outstanding oxidation stability. Available in a range of viscosities, they are recommended for steam, gas and water turbines, bearings of high speed enclosed crankcase steam engines, and certain other circulating systems where oils of turbine quality are required. Shell Turbo Oils are approved by all the leading turbine builders.

The wide Seashell range of specialised industrial lubricants is marketed in nearly every country of the world. There is a Seashell grade for *every* industrial use—and each is available everywhere in the same high quality.

SHELL LEADERSHIP IN LUBRICATION

WORLD-WIDE INDUSTRIAL RESEARCH

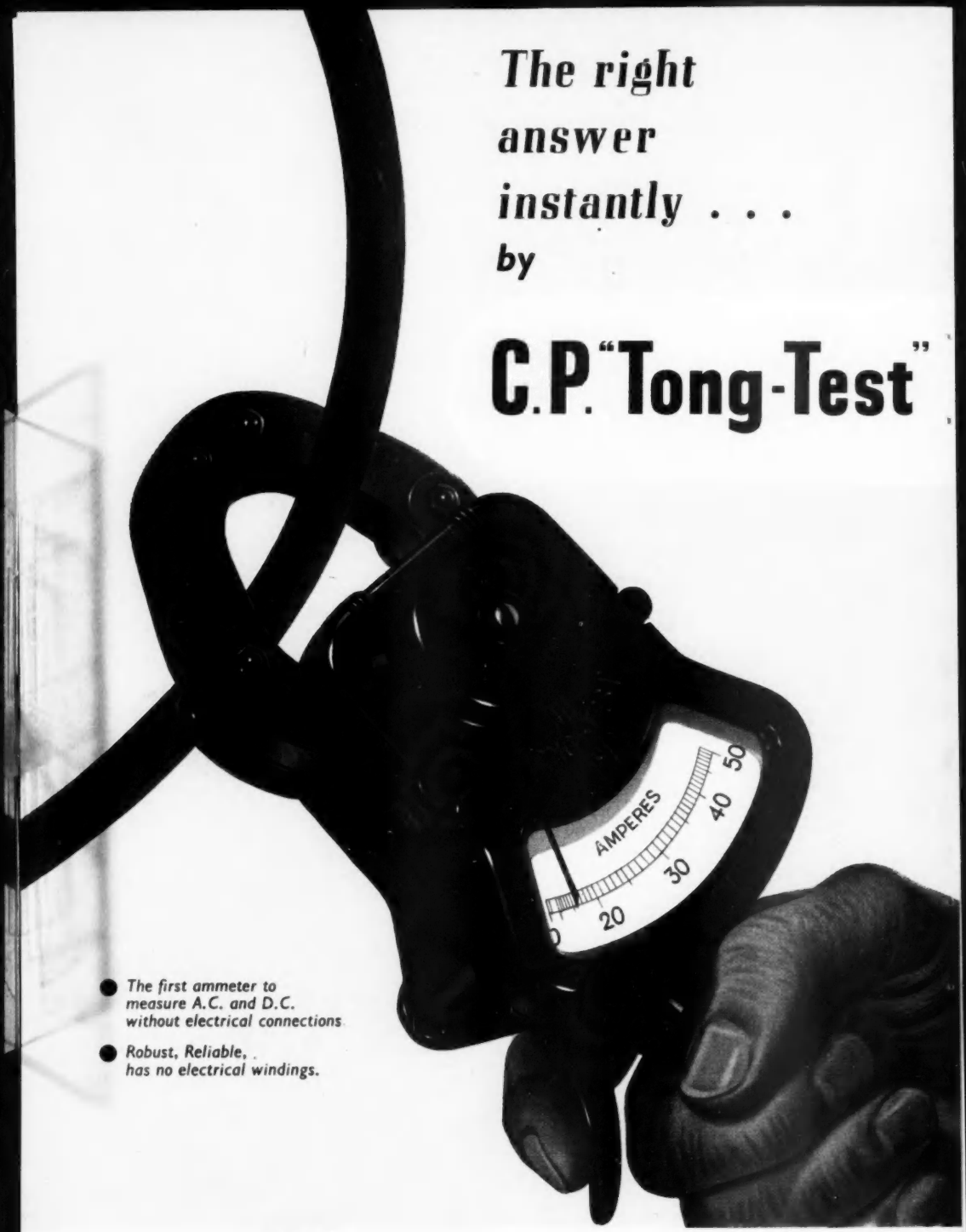
Seashell Oils are produced as the result of *world-wide research*. At Shell's great Thornton Research Centre, and at other Shell Research Centres in Europe and America, scientists and technicians spend their lives studying the special lubrication needs of every branch of industry. The rewards of this research are the Seashell oils—each developed to solve a *specialised* lubrication problem. This is the solid basis upon which Shell has built up its world-wide *leadership in lubrication*.

CALL IN A SHELL LUBRICATION ENGINEER

Shell Lubrication Engineers will be pleased to provide further information and to make specific recommendations for particular purposes. You can be sure of Shell lubrication—it is *specialised* lubrication.

The right answer instantly . . . by

C.P. "Tong-Test"



- *The first ammeter to measure A.C. and D.C. without electrical connections*
- *Robust, Reliable, . . has no electrical windings.*

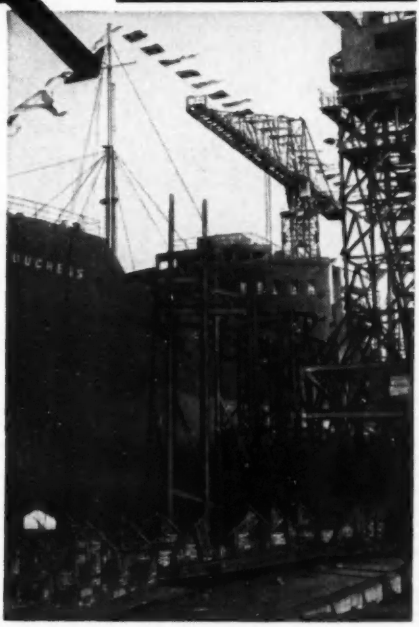
ELECTRICAL EQUIPMENT

Crompton Parkinson LIMITED

CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

Phone: CHAncery 3333 Grams: Crompark, Estrand, London

Over the hills....and far away



Across the hills of Northumberland and Durham there is a ceaseless journeying. Above hill farm and traveller's inn, above the long ribbon of road and the sheen of water, electrical energy journeys through the pylons. From power stations to sub-station, from switch to cable, from meter to lamp, the current races to give light: an infinitely precious thing without which life as we live it today would be impossible.

. . . And at the strategic points on this journey Reyrolle switchgear and protective gear controls and protects.

REYROLLE **SWITCHGEAR**

A. REYROLLE & COMPANY LIMITED · HEBBURN · CO. DURHAM

CRC2PG

TRADE MARK

HIGGS MOTORS LTD.

CHAIRMAN WALTER F. HIGGS, M.I.E.E.

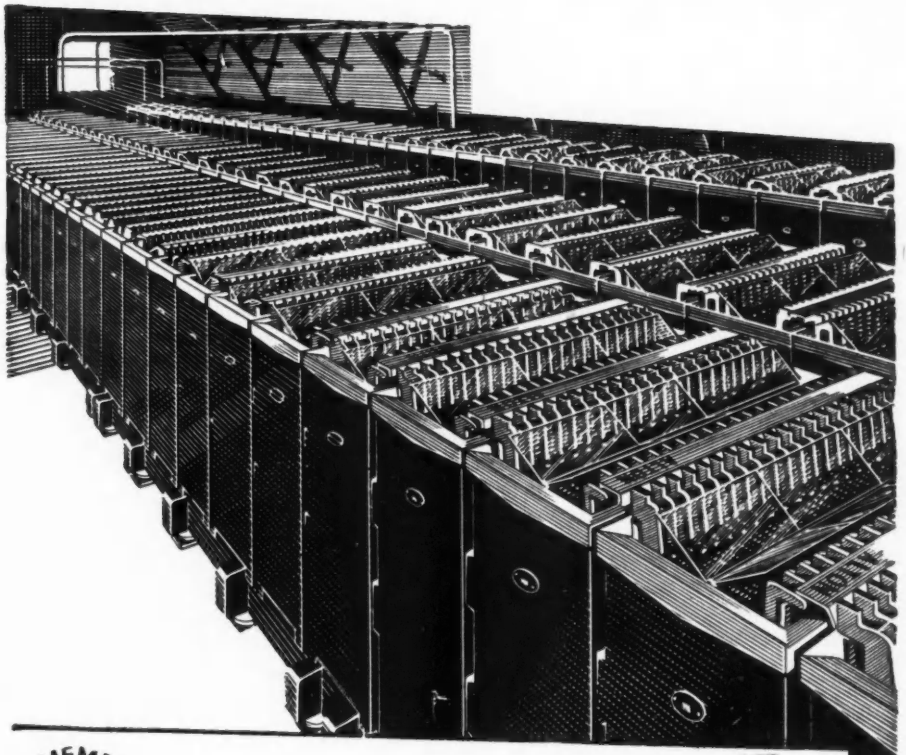
BIRMINGHAM 6 ENGLAND

STATOR & ROTOR UNITS

Saving in space and weight, increased efficiency, compactness, simplicity are a few of the outstanding features relating to the use of these units: available as single or multi-speed machines at reasonable prices and despatch times — send for Catalogue Section 54

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton



REMEMBER GENEROUSLY
SAT · NOV 10

ALTON

BATTERIES OF MERIT

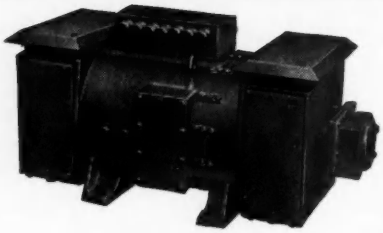
Alton Batteries of 10 to 15,000 ampere-hours are in service in sixty-five countries. The batteries now being shipped out all over the world will carry the name of Alton still further afield—Alton, shortest word in any language for good batteries and firm delivery dates.

*

Alton can also supply renewal plates for all makes of battery, British and Continental

THE ALTON BATTERY COMPANY LTD., Alton, Hants. Telephone: Alton 2267 & 2268. Grams: Battery, Alton

NEWTON-DERBY
ELECTRICAL EQUIPMENT



2½ kVA Motor Alternator. Drip-proof to 45°. Motor 220 volts D.C. Output 120 volts, 3 phase, 333 cycles per second. Motor includes an automatic constant-speed governor. Weight 450 lb.

HIGH-FREQUENCY ALTERNATORS

(*Send for publication No.* 1003)

Also makers of Rotary Transformers and Anode Converters, Wind and Engine - driven Aircraft Generators, High-tension D.C. Generators and Automatic Carbon Pile Voltage Regulators.

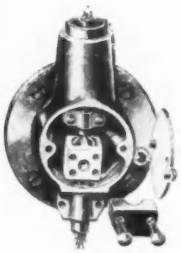
NEWTON BROTHERS
(DERBY) LTD.

HEAD OFFICE & WORKS: ALFRETON ROAD, DERBY.
TELEPHONE: DERBY 47676 (3 LINES) TELEGRAMS: DYNAMO, DERBY.
LONDON OFFICE: IMPERIAL BUILDINGS, 56 KINGSWAY W.C.2.

MEKELITE

GEARED JOINT

INDUSTRIAL LIGHTING UNITS



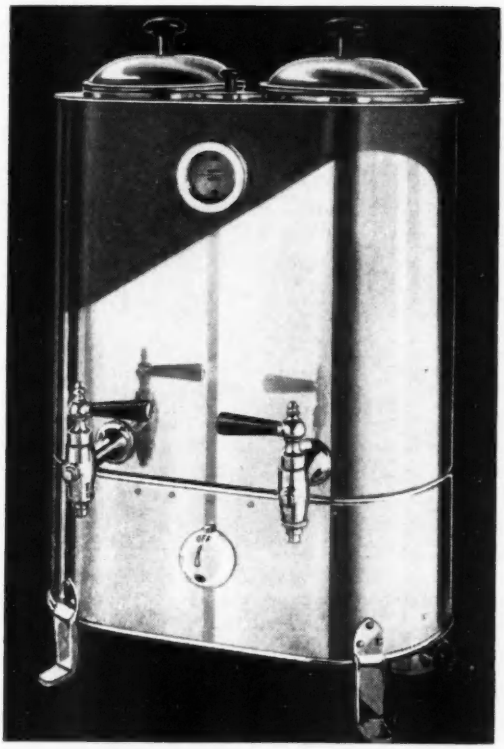
The Connection Box in the base simplifies both installation and maintenance. The cabtyre sheath of the cable is clamped to prevent damage to the cores. Visible earth screw. Bases for wall, bench, ceiling, floor or for mounting direct on machines, as well as portable types. Some with entries for screwed conduit, others with rubber sleeve and clamp for supply cable as illustrated.

Various lengths of arms (maximum horizontal reach 54 in.). With pillar or short vertical pivot. Alternative sizes of reflector. In place of the standard "head" a sudsproof type and another for Edison screw lamps are available.

Catalogue sent free on request

MEK-ELEK Engineering Ltd., 17 Western Road, Mitcham, Surrey
Phone: MITcham 3072 Cables: Mekelek, London

Now He's Happy!



However rushed the demands for "*cuppa cawfee and look slippy*," he has QUICK SERVICE by the flick of a finger.

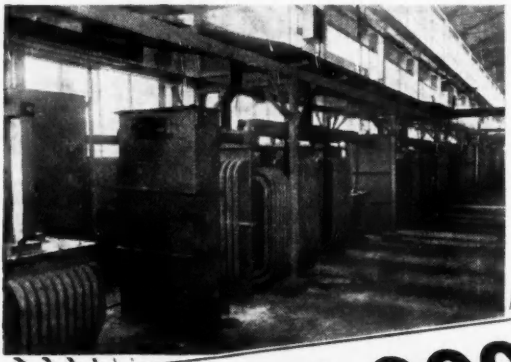
Rather clever this Heatrae *COMBINED* Milk-and-Coffee Urn, with one container for milk and another for Coffee —both kept at even temperature by an electrically-heated water jacket. Easily *the* very thing to meet rush periods at Buffets, Milk Bars, etc.

Write for descriptive literature illustrating and describing the advantages of this special Heatrae product.

Heatrae

HEATRAE LTD • NORWICH • ENGLAND

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flame-proof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

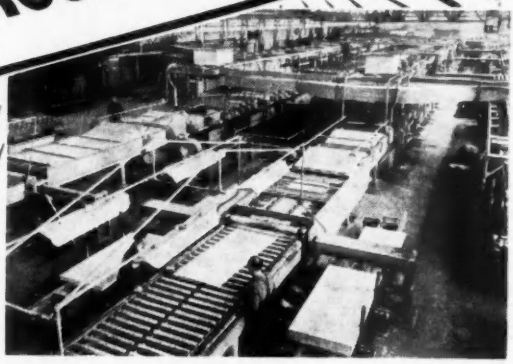


For the electrolytic processes at the Ellesmere Port factory of British Coated Sheets Ltd. a rectifier capacity of 50,000 amperes at 7 volts is provided by ten 5,000 ampere "Westalite" oil-immersed rectifiers. For each of the two plants that are in operation, five units are used, one each for alkaline cleaning and pickling and three for plating. Each plant has a normal output of 250-300 tons per week of steel sheets with a deposit

50,000 AMPERES FOR ELECTROGALVANISING

of zinc varying from .00005 ins. to .0003 ins. or more, to protect them from rusting during storage.

This installation is yet another to be added to the very long list already being served by . . .



Photographs by courtesy of "Electrical Review."

WESTINGHOUSE

WESTALITE PLATING RECTIFIERS

Write for Data Sheet No. 44 to Dept. E.T. 19

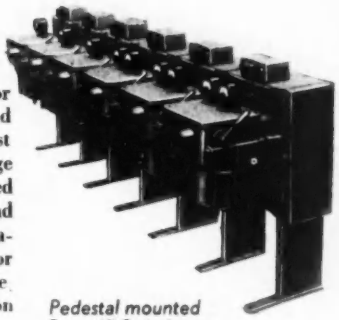
WESTINGHOUSE BRAKE & SIGNAL CO. LTD.
82, YORK WAY, KING'S CROSS, LONDON, N.1.

ELECTRICITY SUPPLY *within the Factory*

LOW VOLTAGE SWITCHGEAR
distributes the supply of electricity throughout the factory.
Reliable switchgear is ESSENTIAL.

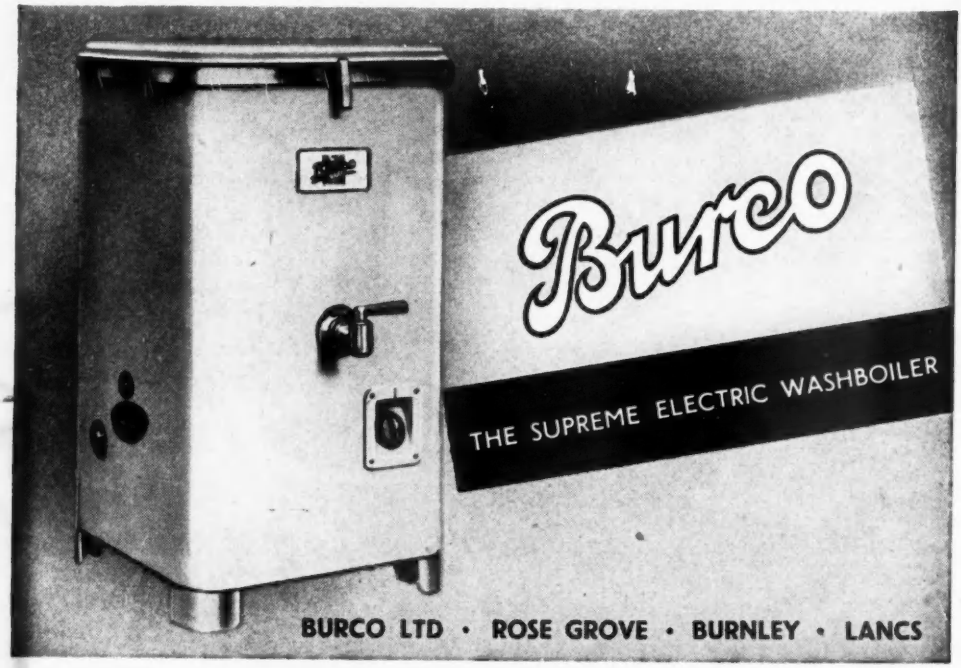
FERGUSON PAILIN
INDUSTRIAL TYPE
'K'
SWITCHGEAR

The provision of an adequate and reliable supply of power for plant operation and lighting in new factories, or extensions and modifications to existing plant arrangements should be a first consideration. In addition to their well-known high voltage designs, 'Ferguson Pailin' manufacture a range of fully tested type 'K' low voltage switchgear, for service up to 660 volts and fully conforming with the appropriate British Standard Specification. Units may be of the pedestal or cubicle type arranged for switchboard mounting; wall mounting designs are also available. Full information on this type of switchgear will be gladly sent on request to interested Executives or responsible officials.



Pedestal mounted Type 'K' Switchgear

FERGUSON PAILIN LTD.
MEMBER OF THE AEI GROUP OF COMPANIES
Switchgear Specialists
MANCHESTER, 11. ENGLAND



ANNOUNCING

MODEL NO.
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for
SPEED
INFORMATION
and
3-WAY
PROTECTION
of
CASH
RECEIVED

A FOUR TOTAL RECEIPTING MACHINE

Providing 3 identical, non-carbon printed records of receipts on

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2. The Receipt Posting Stub
3. The Locked-in Audit Record

ALL TOTALS UNDER LOCK & KEY

National

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Build your own equipment with

DEXION
SLOTTED ANGLE

★ Can be used over and over again

★ No drilling, measuring or painting

★ Just cut it and bolt it, that's all

DEXION LIMITED
Triumph House, 189 Regent Street, London, W.1
TELEPHONE REGENT 4841-5

BICC *Coil-End Flexibles*

ARE *Flexible* AFTER STOVING

When you use BICC Coil-End Flexibles for your coil or winding leads you'll see an end to an old problem. For you'll be using inexpensive flexibles which have been *designed specifically* to withstand the high stoving temperatures and gruelling finishing processes to which coils and windings are subjected. When the time comes for connecting-up there will be no hardened or cracked insulation—these BICC Coil-End Flexibles *will still be flexible* and ready to do their job.

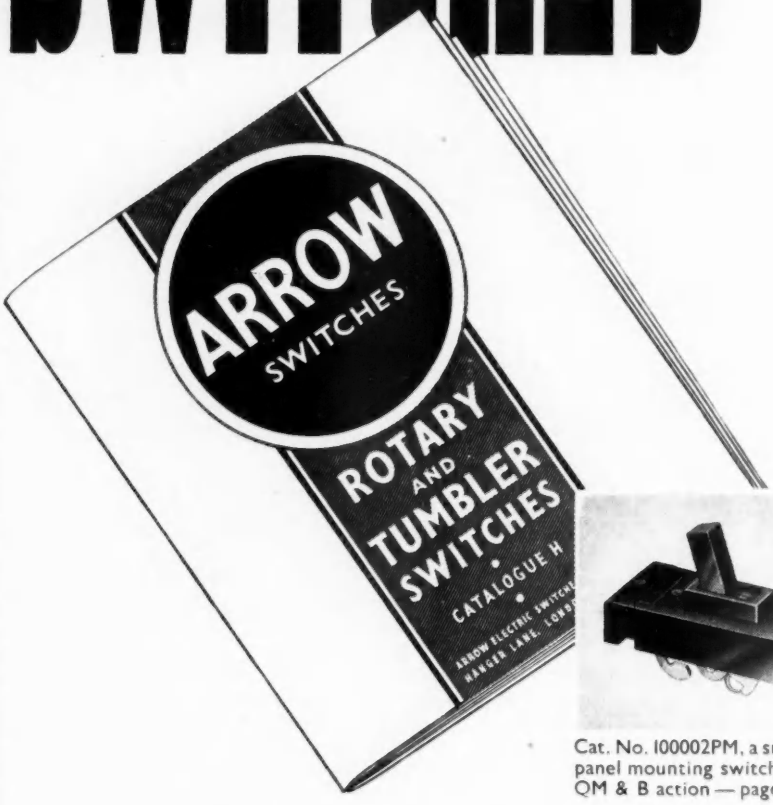
They are manufactured for service up to 6,600 volts and can be supplied with many different forms of insulation to suit individual conditions. If required, expert guidance on the choice of the most suitable insulants for your particular jobs will be given freely by the BICC Technical Advisory Service.

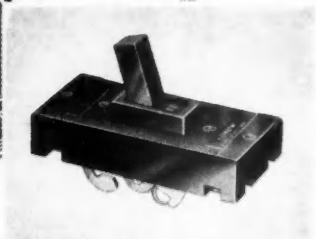
Write for our Publication No.294U which gives further details.

B.I. Callender's

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

SWITCHES





Cat. No. 100002PM, a small compact panel mounting switch, 10A, 250V., QM & B action — page 28.

Yet another selection from the catalogue which illustrates our complete range of precision-built switches.

There is an ARROW tumbler or rotary switch, relay or control unit to suit *your* requirements.

Write today for Catalogue 'H'

ARROW ELECTRIC SWITCHES LTD

HANGER LANE · EALING
LONDON · W.5

Telephone: PERIVALE 4451

INDUSTRIAL HEATERS

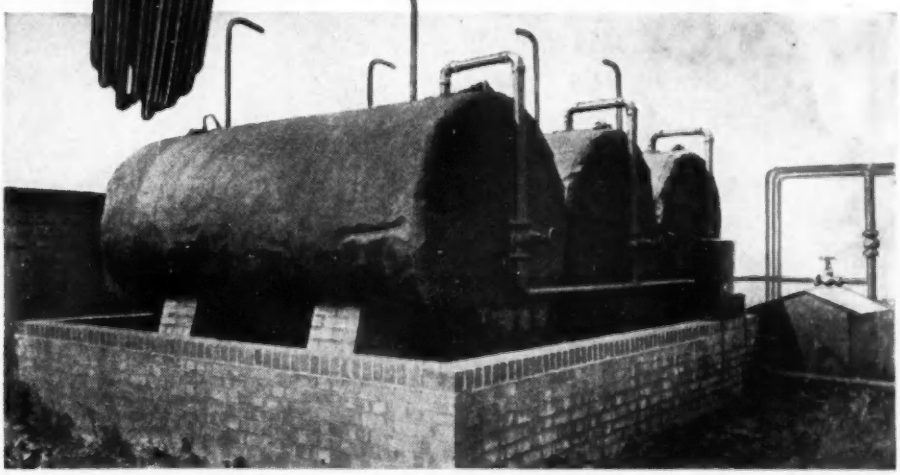
for Water, Oil, and Alkaline Solutions

Electric immersion heaters are only one of many forms of industrial " Pyrobar " heating equipments developed and perfected by BTH. They provide an exceptionally safe, ready, and economical means of heating water, oil, or alkaline solutions for industrial and scientific purposes. An automatic temperature regulating device can be used so that little attention need be paid to the heater over long periods. (1) Shows an immersion heater suitable for A.C. or D.C. supply up to 500 volts. (2) Three oil-storage tanks used for gas-turbine test house each fitted with three 6 kW immersion heaters.

Standard sizes range from 1 kW to 36 kW for water, 1 kW to 3 kW for oil; & 1 kW to 4 kW for alkaline solutions.

Special sizes can be built to order.

Other types of industrial heating equipments manufactured by BTH include : cartridge, " cast-in," radiant, soft-metal, and salt-bath heaters.
Electronic heating equipment is also available.



BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON CO., LTD., RUGBY, ENGLAND

Member of the A.E.I. group of companies

A3975

HART ACCUMULATOR CO. LTD.,

Chequers Lane, Dagenham Dock, Essex

Manufacturers of

STORAGE BATTERIES FOR ELECTRIC LIGHTING AND POWER INSTALLATIONS

EMERGENCY LIGHTING EQUIPMENTS
for Hospitals, Cinemas, Theatres, Public Buildings, Hotels, Business Premises, Factories, Ships, etc.

PRICES ON APPLICATION

BY APPOINTMENT TO H.M. THE KING MAKERS OF ACCUMULATORS

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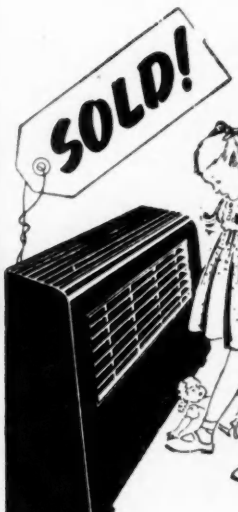
Branches at Birmingham, Bristol, Cork, Dublin, Glasgow, Manchester, Newcastle-on-Tyne, Nottingham, and Westminster.



EFFICIENT 'ALL-ROUND' HEATING . . .

Thermovent's "all-round" heating virtues are so much in demand that supply is a hand-to-mouth affair; safe, economical *uniform* warmth without work or bother is just what the public ordered! However, we are doing our utmost to keep pace.

Thermovent

ELECTRIC SPACE HEATING

E. K. COLE LTD · 5 VIGO STREET · LONDON W.1

SPECIALISED LUBRICATION

Microtime Oils and **Greases** for Clocks, Meters, Fine Instruments and all Delicate Mechanisms. These oils possess extraordinary stability under extreme temperature conditions, do not spread, and give perfect lubrication over very long periods

also

Microloid Dry Lubricant—a quick-drying suspension of colloidal graphite in a non-inflammable carrier.

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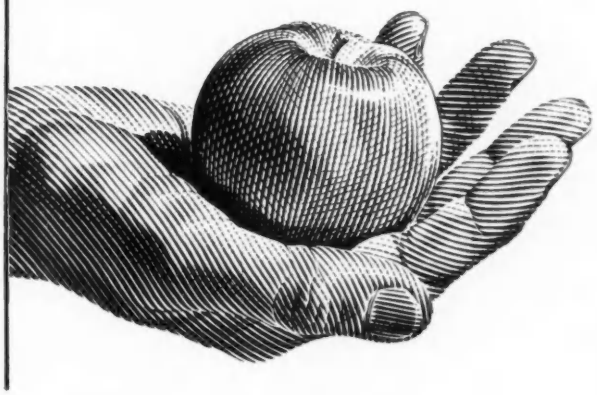

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All makes of fluorescent lamps look 'much of a muchness,' but eventually you will come to know the advantage of installing Osram. Good workmanship and vast technical knowledge — both in research and manufacture — contribute to the excellence of the finished article.

Osram *the wonderful lamp*

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A G.E.C. PRODUCT

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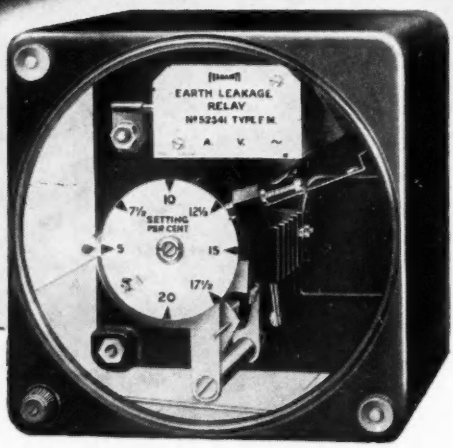

This newly designed Type FM relay possesses many interesting features:—

Balanced armature in jewelled bearings ensures great sensitivity.

Mechanical catch prevents operation due to vibration.

One, two or three pairs of independent contacts can be fitted, to close or to open circuit.

Continuously variable settings.

Moulded case of pleasing appearance.

External resetting of contacts and flag indicator.

Please write for List IR.6 giving full particulars.

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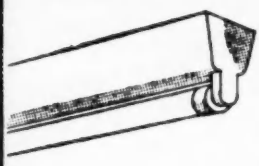
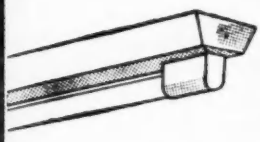
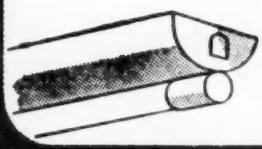


Type **DD 300**
3ft. BATTEN
Retail price—
£3.7.6

also **DD 400**
4ft. BATTEN
£3.10.0



Type
DD 500
5ft. BATTEN
Retail price—
£4.12.6



Type **18 R**
5ft. BATTEN
Retail price—
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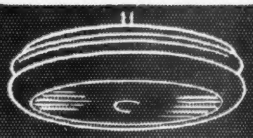
"Fluoradisc" 1001 £8.5.5



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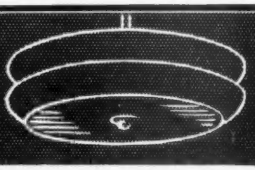
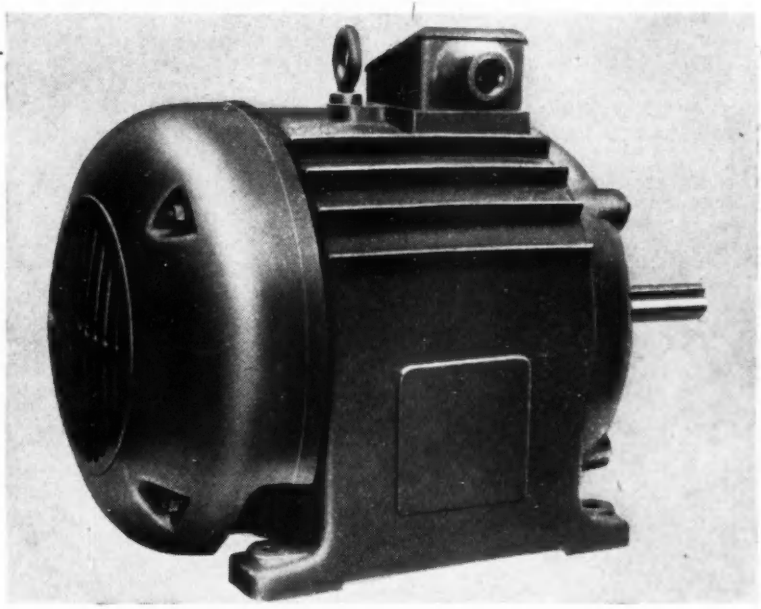


"Fluoradisc" 1005 £12.12.0

'ENGLISH ELECTRIC'

industrial motors



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A complete range of 'ENGLISH ELECTRIC' A.C. and D.C. electric motors has been designed to meet every form of drive and every type of machine. Included are squirrel-cage and slip-ring motors in all sizes and enclosures, stator-rotor units and other special duty machines. The motors are also made in a comprehensive range of mountings to suit all types of machine tools.

Illustrated is a totally enclosed fan cooled squirrel-cage motor class IJ, which has wide industrial applications.

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Industrial Motor Works, Bradford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

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The Domestic Appliances Section of Johnson & Phillips Ltd.
NEWARTHILL . MOTHERWELL . SCOTLAND

'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

The **Model 40** Universal AVOMETER

BRITISH MADE

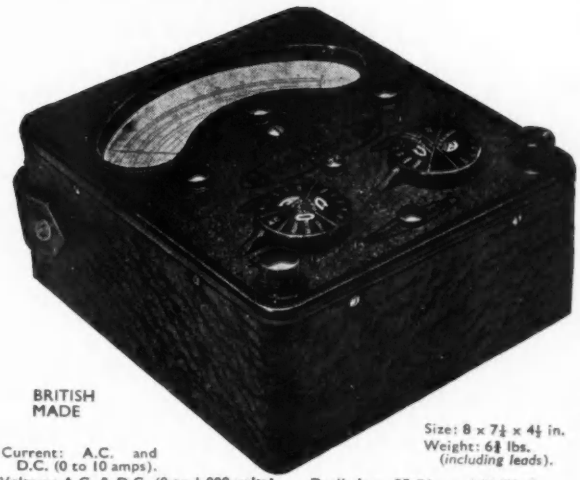
A multi-range A.C./D.C. Measuring Instrument of B.S. 1st grade accuracy, providing 40 ranges of readings on a 5 in. hand-calibrated scale. Range selection is by means of two rotary switches, for A.C. and D.C. respectively. A press-button provides an additional range for each value of current and voltage shown on the switch knobs. The total resistance of the meter is 200,000 ohms. An automatic cut-out provides protection against damage through severe overload.

This instrument has been specially designed for the electrical industry.

Current: A.C. and D.C. (0 to 12 amps.).
Voltage: A.C. and D.C. (0 to 1,200 volts).
Resistance: Up to 1 megohm.

Size: 8 ins. x 7½ ins. x 4½ ins. Weight: 6¼ lbs. (including leads)
Leather Carrying Case available if required.

The **Model 7** Universal AVOMETER



BRITISH MADE

This instrument provides 50 ranges of readings on a 5-in. hand-calibrated scale. The total resistance of the meter is 500,000 ohms, and an automatic cut-out provides protection against damage through severe overload.

The two models illustrated can be used for the measurement of Power Factor and Power in A.C. circuits. An external Power Factor and Wattage Unit is available for this purpose, details of which will be furnished on application.

Size: 8 x 7½ x 4½ in.
Weight: 6¾ lbs.
(including leads).

Current: A.C. and D.C. (0 to 10 amps).
Voltage: A.C. & D.C. (0 to 1,000 volts).
Resistance: Up to 40 megohms.
Capacity: .01 to 20 μF.

Decibels: —25 Db. to +16 Db.
Audio-frequency Power Output: 0 to 2 watts.

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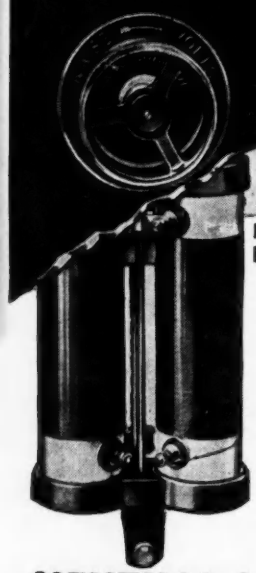
Sliding RHEOSTATS



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Giving a performance superior to that of the finest multi-contact rheostats, ISENTHAL Tubular Sliding RHEOSTATS are designed to stand up to continuous heavy service and provide infinitely variable current in the circuit. Main insulation is of Vitreous Enamel. Terminal stems are so constructed that they cannot turn and allow the wire to slacken or break.

We will gladly supply full details upon request.

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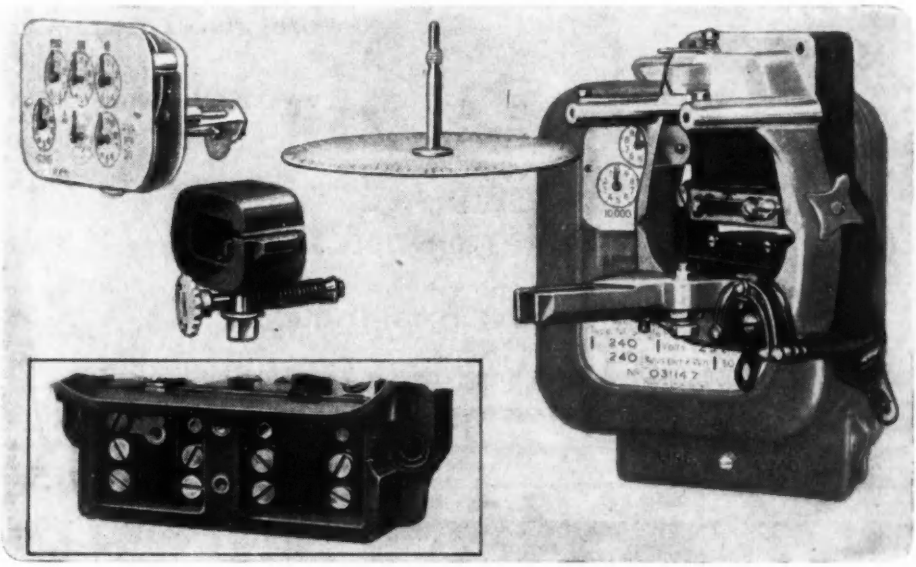
Associated with THE LIVERPOOL ELECTRIC CABLE COMPANY LIMITED, AND VACTITE WIRE COMPANY LIMITED

Meticulous Metering

by the METROVICK TYPE NF Watt-hour Meter



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The NF Meter has been designed to give effect to extreme simplicity of dismantling and free access for adjustment. The illustration shows the disposition of the components and the ease with which connections to the terminal block can be made. The cable is effectively secured by two OBA pinching screws on each terminal. Rotors and bearings are interchangeable.

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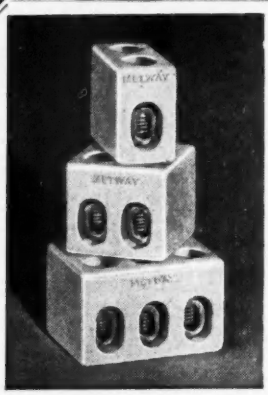

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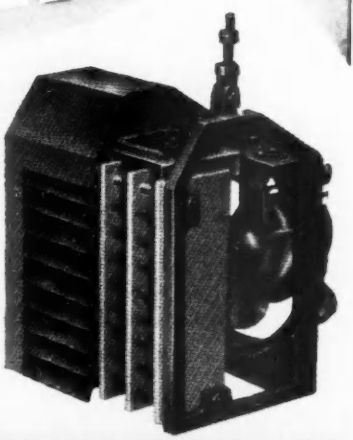

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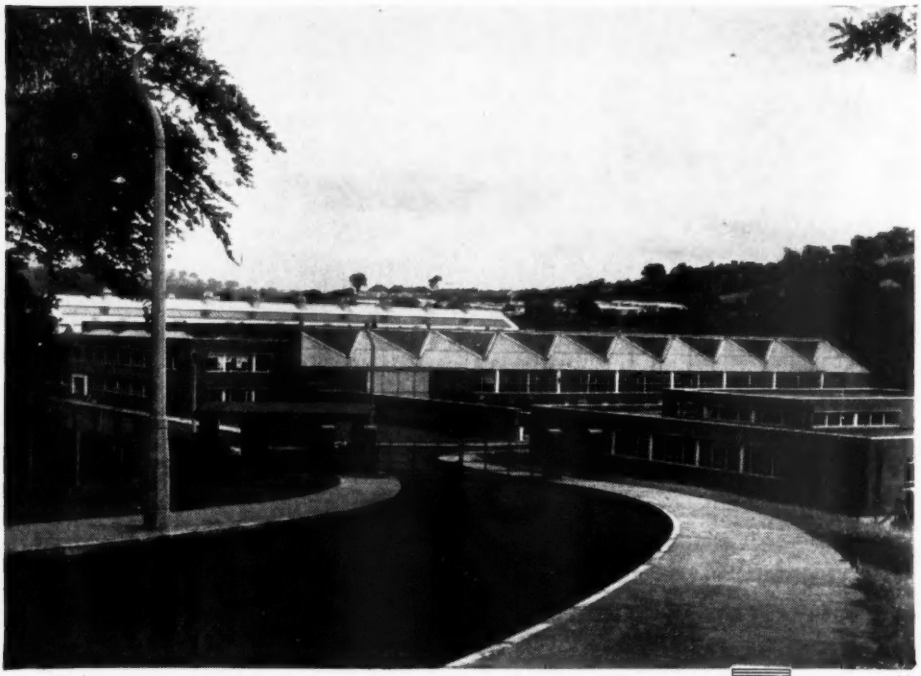

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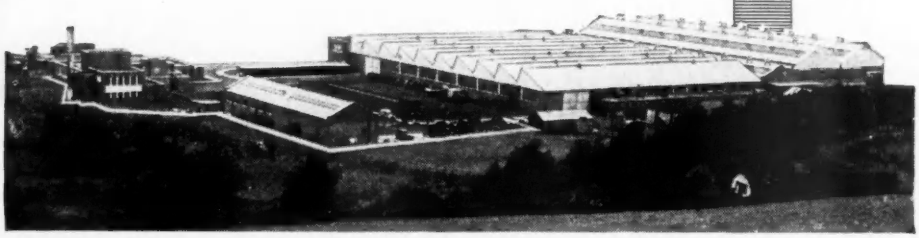

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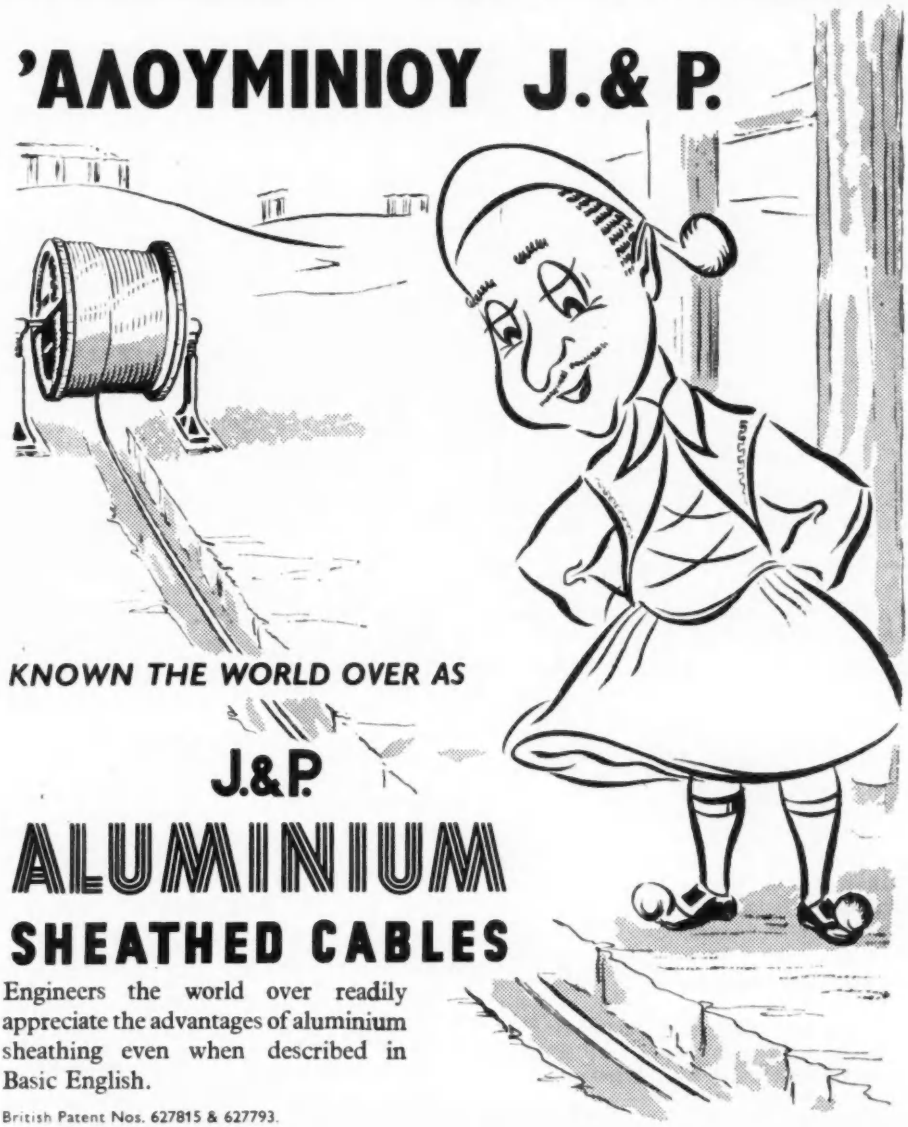

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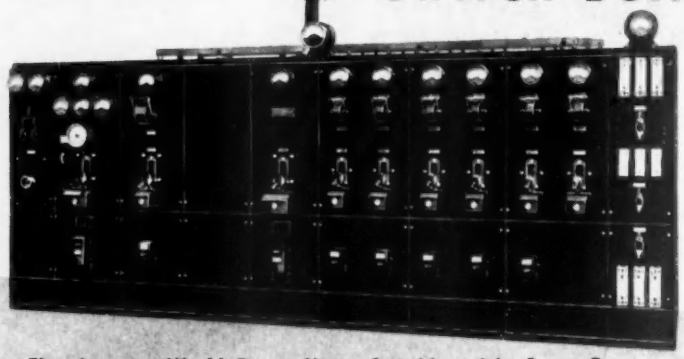

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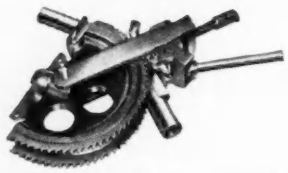

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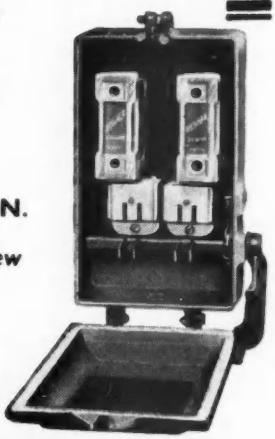

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33 kV to 330 kV

OIL-FILLED SUPER TENSION CABLE

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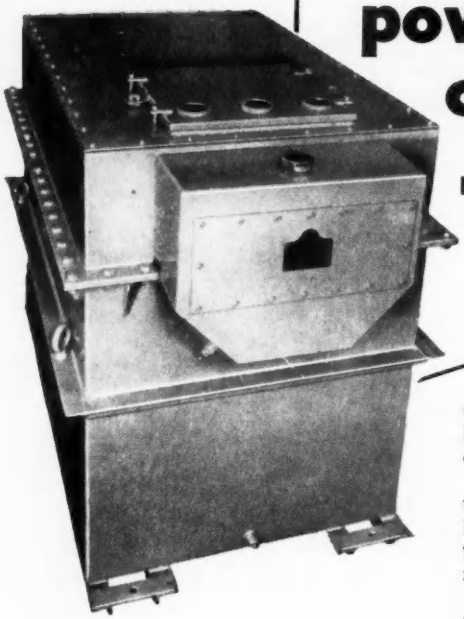
high voltage capacitors for power factor correction

1000 volts and over



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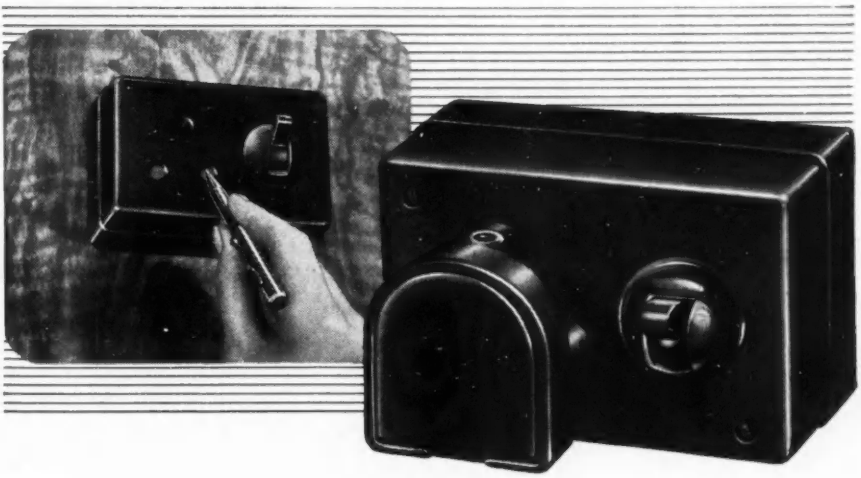
POWER LINE DIVISION, (Department 2440) NORTH WOOLWICH, LONDON, E.16. Telephone: ALBERT DOCK 1401 (EXT. 796)



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- ★ **the phase tubes cannot be exposed by pushing the shutter out of position with a pointed instrument.**
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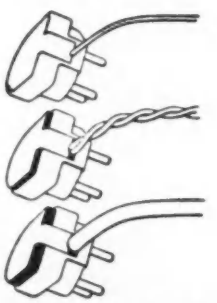
TEMCO Plugs adjust themselves automatically to suit varying thicknesses of flex. There are no loose parts.



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measure accurately

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Easy variable tariff adjustment

Simple, positive coin action

Switch withstands heavy overloads

Quick, safe, switch break

Single unit construction

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ELECTRICAL TIMES

Vol. 120 No. 3129 THURSDAY, 25 OCTOBER, 1951

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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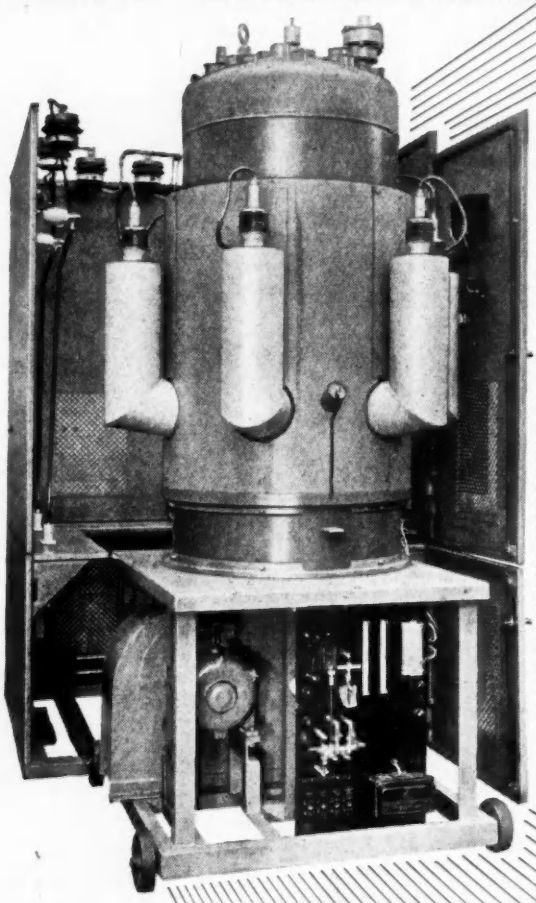

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Editorial

OUR OWN JUBILEE

THE Electrical Industry has reached a stage in its evolution where those who have their roots in its earliest days are attaining notable anniversaries, and scarcely a month passes without some firm celebrating at least a golden jubilee. Perhaps, therefore, we may be excused when we draw the attention of readers to our own sixtieth year which we reach this week. There may be but little virtue in the number sixty, it is not even the age for the receipt of the old age pension, but we excuse ourselves by recalling that our golden jubilee passed unsung amidst the trials of war and the limitations of paper rationing. One other reason we may mention. The occasion is an opportune one for the publication of some reminiscences of those early days by Mr. R. W. Hughman. His unique experience of fifty-six years with an electrical journal provided him with a bird's-eye view of the whole development of the industry during its formative years. He knew personally those men of that age whose names are now enshrined in the history of our industry, and was a champion of many of those causes from whose early battles there have emerged the characteristic features of our industry today. It is hoped that his reminiscences will paint for our readers a picture of electricity in the good old times.

MAKE IT PUBLIC

LAST week Meteor commented on the public arguments against electric fires which were a feature of the Combustion Engineering Conference. The subject was again raised last Monday, when SIR JOHN HACKING opened an informal meeting of the I.E.E. on the related subject "The Place of Electricity in a National Fuel Policy." In the ensuing discussion a full and cogent reply was given to all the arguments against using electricity to warm people in their homes. On grounds of efficiency, amenity and practical convenience the manifest advantages of the electric radiant heater were demonstrated: yet only seventy or so people will ever know what was said, against the millions who read the diatribe offered by the Minister and the gas and solid fuel interests at the earlier conference. This, because the I.E.E. quite rightly forbids the reporting of speeches made at informal meetings. The solution clearly lies with the E.D.A., which should take steps to persuade the speakers to state publicly their beliefs in some suitable manner. This is necessary, not only for the good of our industry, but also from the wider importance of a truly economic national fuel policy.

WORKING ABROAD

GENERAL recognition of the importance of some practical training concurrent with the academic education of engineering students has widened of recent years into an appreciation of the many advantages resulting, if part of that experience can be obtained abroad. Unesco, adventuring in this field, found a ready-made organisation in this country, and the International Association for the Exchange of Students for Technical Experience resulted. The fourth annual report of the Association, which appeared last week, shows how successfully the idea has been applied in Europe, and the extent of expansion revealed, geographic as well as numerical, is especially praiseworthy. Fourteen countries in this continent took part in the scheme last summer, with Israel and the U.S.A. joining in to give a wider world flavour. The anticipated co-operation of Turkey and Yugoslavia in 1952 should still further improve the situation. Perhaps the most encouraging feature of the matter is the willingness of industry in all countries to lend support. Last year over £100,000 was contributed directly by industry, quite apart from the considerable sums involved indirectly in accepting them for training. The electrical industry is particularly well represented in the list of

British concerns helping in this way, and it is to be hoped that in the coming year it will extend still further this activity.

UNITS TO USE

WHEN, some eighteen months ago, the I.E.E. staged a symposium on M.K.S. units, *Meteor* noted in these columns the unusual unanimity of engineers attending the meeting in favour of this system of units in its rationalised form. Difficulties in the general adoption of the method arose from the early training of the engineer by physicists, but there were obvious ways in which these could be overcome. This month there comes a dissenting argument from Mr. A. W. Hirst, the well-known author of electrical textbooks, which is expressed in his chairman's address to the I.E.E. East Midland Centre. He forthrightly suggests that the audience attending the symposium did not represent a true cross-section of the profession as a whole, and from this concludes that their enthusiasm must to some extent be discounted. Though himself in favour of the introduction of M.K.S. units, he draws on his teaching experience to suggest that the student's introduction to them should be postponed until the beginning of his Higher National course, or its equivalent. On this commonsense view, the student will have to learn to appreciate and use three systems of units, but this does have the advantage that he should come to realise their relative merits for practical work.

STREET-CAR NOT DESIRED

IT is ironical that the diamond jubilee of the overhead trolley tram should almost coincide, not only with our own, but with the occasion of another instalment of the wholesale scrapping of its life-long rival, the conduit tram. This occurred less than a fortnight ago, when London Transport disposed of another 56 route miles. As a good electrical engineer, *Meteor* has a weakness for trams and still feels that this wholesale clearance is to be deplored. Since shortage of capital is given as the reason for restricting other essential needs these days, how can we afford to spend £9 million (which in these days of rising prices will probably be an under-estimate) on replacing a service which could be made to "soldier-on" a little longer? And are London's existing bus services so plentifully supplied with vehicles that new construction can be diverted to these new routes on a basis of little more than one-half the passenger capacity of the vehicles replaced?

BURIED COPPER

PROVINCIAL cities which installed overhead trolley wires have been more fortunate, since their systems have lent themselves more readily to trolley-bus conversion—the one vehicle which makes an adequate replacement of seating capacity on a one-to-one ratio—and had the L.C.C. not held so tenaciously to the conduit system, today's story might well be different. Change-over from plough to trolley-arm operation *en route* presents no difficulties whatever—in fact it occurred wherever L.C.C. vehicles ran over lines belonging to another authority. Yet as late as the 1920's, an extension right to Bromley was carried out in conduit, although the cost per mile was at least twice that of overhead construction, and extensive road works will now be necessary to dig out the steel and copper which is buried so snugly.

THREE-STAR FILM

WHEN the British Electrical Development Association started their series of educational films, a bright future was prophesied for them, which subsequent events have justified. The winning of a premier award in the international field reported some time ago was a fair guarantee that their quality was not misjudged. Quite apart from this aspect, however, Mr. Dale's recent announcement that 1,450 copies of E.D.A. films have been purchased in addition to the 700 copies in general circulation, is an endorsement of their popularity. *Meteor* forecasts an equally good reception for their new venture, the instructional film, the first example of which is reviewed elsewhere in this issue. If subsequent films in this new series maintain the standard of restraint and imagination set by the first, their future is assured.

Meteor

ROBERT W. HUGHMAN ESQ.

THE GOOD OLD "TIMES"

To mark the occasion of the sixtieth anniversary of the ELECTRICAL TIMES, *we have pleasure in presenting these reminiscences of Mr. R. W. Hughman, Companion I.E.E. He joined the staff at the commencement of publication in* 1891 *and for* 56 *years continued to serve the paper during the most difficult days of the Supply Industry until his retirement from the position of Managing Director.* — *Ed.*

Registered at Stationers Hall October 1891-1951 Vol.1-CXX

AS one who assisted at the birth of this journal in 1891, and devoted his working life to it (except for an interlude from 1914 to 1918) until his retirement in 1947, I have been invited to give the electrical engineers of today an idea of what the electrical world was like sixty years ago, when Queen Victoria was 72, and I was 21.

Should this mention of Sovereign and subject in the same breath be regarded as *lèse-majesté*, I shall invoke the protection of the First Offenders Act.

If I may count on your co-operation, good reader, will you please imagine that you are a a Rip van Winkle in reverse. You go to bed as usual tonight, and in the morning you will hear in a dream the occasional jingle of harness, the ambling clop-clop of hoofs, and the grinding of metal-tyred wheels on the grit of a macadam road.

You know you are dreaming because the sounds are all of horse-traffic, not motor cars. Then the yodelling of a milkman surprises you, and you stretch an arm to light the reading lamp on the side-table, but what you grasp is a squat, wide-based metal saucer with a column in the middle, holding a candle. You strike a match, and watch the wick slowly build up its one c.p. Meanwhile the match-flame reaches your fingers and burns them sharply. Here is where you get your first startling jolt into reality. Hastily you jump out of bed, trip over your long white night-shirt, and knock your nose on the carpet.

This is a strange room. Where is the window? There are heavy curtains to be dragged aside, and heavy venetian blinds to be hauled up before you can look out into a dingy yellow but not dense autumnal fog. (In 1890 London had 156 foggy days.) The few vehicles that go by carry the hirelings of butchers, bakers and fishmongers, collecting or delivering orders. As you pass by the wardrobe mirror a strange face with a heavy cavalry moustache confronts you. Here is where your fortitude almost succumbs. Can this be you? It is.

Luckily, a familiar sound diverts your attention from that moustache. Someone is knocking at the door. You rush to open it, but all you see is a hot-water can with a little steam oozing from under the lid. You take it in. It is coloured brown, like the round sponge-bath which lies on a square of oil-cloth in a corner of the room. This bath is about a yard in diameter and six inches deep, and it contains two inches of cold water. You shirk any attempt at bathing, and wisely, for a novice would splash water all over the floor and wet himself only in patches. After a hurried wash and brush up, a rummage through wardrobe and drawers enables you to dress in a morning coat, white shirt with stiffly starched breast-plate and cuffs, a 2½-inch upright collar, a sober tie, and dark trousers. There is a gold chain on the dressing table with a thick half-hunter at one end and a silver sovereign purse at the other. With some relief you open the latter and count £6 10s. in gold.

You are almost numb with surprise as you descend the unfamiliar stairs. A glimpse over the banisters of someone in a white apron and white cap flitting along a passage gives you a back bearing on the breakfast room. The sight as you enter induces your first touch of reassurance. (The two maids have been working since 6 a.m.) There is a great glowing fire of Silkstone coal. On the table an ancestral silver tea-service shines. The pot

. . . Can this be you? —It is! . . .

is full of tea, hot, strong and fragrant; the jug full of cream; the basin heaped with sparkling lumps. On a hot-water dish rests a generous display of bacon and eggs. Toast, butter and marmalade in profusion. And, on a footstool near the fire, the *Daily Telegraph* being warmed for the lord and master.

You take up the paper. The date is October 22, 1891, some years before the *Daily Mail* or the *Daily Express* begins to bid for your halfpenny. You note that Lord Salisbury is Prime Minister, and that William Gladstone, a strong, healthy lad of 82, is after his job.

Believing that the worst can be best faced on a full stomach, you take on board a helping of bacon and eggs, another of eggs and bacon, all the toast, dollops of butter and home-made marmalade. The big moustache-cup is emptied three times, and it saved your new moustache most effectively from being submerged.

Time to go forth into the world. You take a topper from the hatstand, put on a black melton cloth overcoat with a velvet collar, pick up brown kid gloves and rolled umbrella, and adventure into the unknown. Our best wishes go with you. You will soon be able to confirm or criticise the observations set out below.

Six- to Ten-course Dinners

Queen Victoria's reign did not end until 1901. During the E.T.'s first ten years of life she had been almost canonised by her people. Her golden and diamond jubilees (1887 and 1897) evoked unprecedented celebrations both here and abroad; she was the greatest monarch in the world. To the late Kaiser Wilhelm she was "Dear Grandmamma," and he didn't dare to forget it.

. . . Gentlemen "The Press"

At every public dinner the toast of "Her Most Gracious Majesty the Queen" was always the occasion for a set speech. "It needs no words of mine to commend this loyal toast to your notice. Our beloved, gracious and venerable Sovereign . . . solicitude for every class of her subjects . . . shining example of noble womanhood . . . selfless devotion to duty . . . Empire on which the sun never sets," etc., etc., for ten minutes or more.

The toast of The Prince and Princess of Wales and the other members of the Royal Family also frequently claimed a speech; and the third toast—that of the Navy, the Army and the Auxiliary Forces—was nobly acknowledged by three voluble and whiskered warriors, who scorned to take less than ten minutes apiece.

Thus much time was occupied before the main oratorical business of the evening began. At electrical dinners the last toast was invariably "The Press." This generally came on after 11 p.m., when a food-and-speech-surfeited audience was slipping out to catch trains or cabs. To the pressmen this was a great trial, as one of us was condemned to stay and respond. So I talked in and out of season to the organisers of electrical feasts, and gradually one after another agreed to drop this toast, to the relief of the whole fraternity.

Journalistic Thumb-biting

Perhaps "fraternity" was not at first the right word. In the naughty nineties most of the electrical journals took a dim view of their competitors. Harry Alabaster and Tom Gatehouse, the proprietors of the *Electrical Review*, would not be seen in the same room with Tucker, chief proprietor of the *Electrician*, or Biggs, proprietor of the *Electrical Engineer;* and they all regarded the *Electrical Times* as an *enfant terrible*. Also between Tucker and Biggs there was a feud. I never knew how hostilities began, but I believe that Biggs was once on the staff of the *Electrician* or the *Electrical Review*, or both, and that when he came into some money he left and started a rival paper.

These bad feelings found expression in the editorial columns, and the E.T. played its part by running a weekly page called "Our Electrical Review of Reviews," in which the latest issues of the other journals were sprayed with informed but acidulated criticism. Madden, our then editor, regarded this as a labour of love. On occasion I too swung a shillelagh with youthful zest. But as time went on I felt that friendly relations would be better and less

undignified for all of us. It was hard, though, to know how to approach the unapproachables.

At long last an opportunity arose. After the first Olympia Electrical Exhibition in 1905, which was a great and unexpected success, a deputation of our fellow exhibitors asked me to organise an appeal through the E.T. for providing the Executive Committee of the Exhibition with mementos in recognition of their good work. It was certain to me that any such action by the E.T. would bring all the other journals down on us in full cry; so I made the counter-suggestion that I should be authorised to ask the other journals to participate in a joint appeal by the whole electrical press.

Never have I had to use so much diplomacy as on this venture. First I approached Alabaster and Gatehouse, who flatly refused to meet Tucker or Biggs. Then Tucker flatly refused to meet Biggs or Alabaster or Gatehouse, and Biggs was naturally extremely coy. After much going to and fro, I managed to rope in Biggs and then Tucker; and ultimately Alabaster and Gatehouse were induced to give a grudging consent hedged about by conditions, one of which was that the others should come to them and accept lunch.

At length all parties met for the first time under one ceiling, looking rather like a pack of strange and suspicious dogs. But it was not long before some tails began to wag, and at the presentation ceremony there was not one bark or yelp.

Since then the gentlemen of the electrical press have been not merely keen competitors but also professional friends, conscious that like any other section of the electrical industry they had many common interests and loyalties.

Deputation to I.E.E.

The value of this new spirit was strikingly proved in 1912 when the I.E.E. (Mr. Duddell being President), seeking to increase its revenues in order to support its new home on the Embankment, decided to canvass for display advertisements in the I.E.E. *Journal*. The electrical weeklies were able to take prompt joint action. They asked the Council to receive a deputation. It fell to me to prepare the case for the electrical press and to act as spokesman. When we met the Council every weekly journal was represented: seven in all.

The Council recognised the strength of our appeal and abandoned its scheme. Not until 1922, when as a result of the war the I.E.E. was faced with financial stringency, did the I.E.E. *Journal* contain trade advertisements.

A Toy Industry

One of the greatest differences between the electrical world of the nineties and that of today is in size. In December 1891 we proudly stated that there were no less than 300,000 incandescent electric lights running in London. The National Telephone Company was serving no less than 10,000 subscribers or "stations" in the London area on a flat rental of £20 a year.

We served a toy industry then. There was an air of adventure and discovery. New inventions came on record daily. Electrical engineers were nearly all young and enthusiastic: that is, those concerned with the newer branch which provided electric light. Electric telegraphs and submarine cables were well established; the Stock Exchange thought highly of their securities. But the electric light people were newcomers. They agitated in 1892 for better representation on the Council of the I.E.E., which was dominated by professors, telegraph men and government officials; and they were tired of sitting, snubbed and silent, during the discussions whilst the professors lectured instead of debating. The Council was given a shock, and it nominated five practical electrical engineers for seats at the next Council election. Nevertheless the bickering between theory and practice persisted into the new century. The total I.E.E. membership (including students) was less than 2,000 in 1891, although the tests for admission were sadly lax by later standards. Not until 1910 did the I.E.E. acquire a lecture theatre of its own.

... electrical engineers were nearly all young and enthusiastic ...

The electric light engineers also had their own internal war about systems of supply. One side plumped for low-pressure direct current generation supplemented by accumulators; the other side offered high-tension a.c. single-phase generating at about 2,000 volts, with transformers feeding into the consumers' network at 100 or 200 volts. But the area of supply in either case was normally a radius of one or two miles from the parish pump.

The Electric Lighting Act of 1882 had

enjoined that the municipality should always have the first choice of supplying within its own area; but should it allow a company to work the concession, the company could be bought out after 21 years on payment of the then value of the mere material equipment, with no allowance for goodwill. This throttled progress for six years and sent most of the electric light pioneers into liquidation. In 1888 the lease period under the 1882 Act was extended to 42 years, and this gave private enterprise a chance to escape complete suffocation.

Unwritten History

Here it may be relevant to insert two little bits of unwritten history, told me by an Electricity Commissioner long since dead. They came to him from one of the oldest inhabitants of the Board of Trade. The first relates to Joseph Chamberlain and the Electric Lighting Act of 1882. Joseph had spent three dazzling years as Mayor of Birmingham, from 1873 to 1876, and what he accomplished is given in this extract from one of his private letters dated June 1876.

"I think I have now completed my municipal programme and may sing *Nunc dimittis*. The Town will be paved, parked, assized, gas-and-watered and *improved*—all as a result of three years' work."

This year (1876) he entered Parliament, trailing clouds of (municipal) glory from Brum, which was his home. Four years later, in 1880, he walked into the Cabinet as President of the Board of Trade, and when in 1882 he had to pilot the first Electric Lighting Bill through the Commons he, the municipal gas champion, took good care that the apple of his eye, the Birmingham Gas Department, should not be jeopardised. The Act certainly had a savage blighting effect on electrical progress for 6 years, and the amending Act of 1888 could never make up for the precious years lost.

The other bit of unwritten history concerns the 1888 amending Act. As soon as it was passed the Board of Trade was overwhelmed with applications for Electric Lighting Provisional Orders. In London, the richest area, these overlapped several deep, and the Permanent Secretary of the Board foresaw a troubled time if all these conflicting London claims had to be sorted out. So he dispatched emissaries to Colonel Makins, the Governor of the Gas Light and Coke Company which had supplied the larger part of London with gas for many years. Their mission was, in short, to inform the Colonel that if his company would promote an omnibus Provisional Order for their part of London the Board of Trade would give it preference. Colonel Makins was reminded of his advantages : namely his possession of a wealthy organisation that already supplied light and heat on an enormous scale, that knew all about laying mains and reading meters, and that could still hold their customers if these wished to adopt electric light. The Good Old Victorian Colonel refused to touch this proffered gold mine. He didn't believe in electricity. Can you beat it?

. . . took great care that the apple of his eye should not be jeopardised . . .

A.C. versus D.C.

In October, 1891, this journal was born into an electrical world where there was only one municipal station in operation, viz. Bradford, then a few months old. They never spoke in those days of power houses or bulk supply; each little system was isolated and contained a central station—so called because it was placed as near as possible to the electrical centre of gravity of the prospective demand—which supplied light and little else. There was no linking up with adjoining supply systems.

Both these a.c. and d.c. schools were watching with mingled admiration and misgiving a young man, S. Z. de Ferranti, who was actually transmitting single-phase a.c. at 10,000 volts through concentric cables, with the outer earthed, from a generating station at Deptford to a transformer substation in Maiden Lane, Strand, nearly seven miles away. In 1889 the system was visited by T. E. Edison, who was critical, and thought his own low-pressure d.c. methods were superior, especially as regards the safety of the public. But we had here the germ of the grid and the superstation, and when these came a generation later the old 10,000 V cables were still in regular operation. They were not finally disconnected until 1933.

London presented a special case in those early days. It was governed by local Vestries, who had not quite shaken off the Bumbledom depicted in Dickens. Yet it contained the richest and most compact body of light users in the world. Central and west London was a solid mass of shops, offices, clubs, theatres, mansions, and houses with at least three domestics. The Vestries were afraid to venture

into municipal trading; and were besieged by a horde of companies clamouring for concessions. Some offered a.c.; some d.c. A perplexed Board of Trade decided to allow in many parishes two companies to operate : they would help to solve the battle of a.c. *versus* d.c. and consumers would have the benefit of competition. An unprecedented tearing up of streets for mains laying was a concomitant nuisance.

Light and Little Else

The central stations earned 90% or more of their revenues from supplying light, and it was quite usual for them to describe the capacity of their generating sets in terms of the number of 8 c.p. lamps that could be fed simultaneously. An 8 c.p. glow lamp was rated at 30 to 35 watts. Thus, one talked of a 5,000-light dynamo, meaning thereby one that on full load generated 150 to 175 kW. The lighting of streets, large shops, markets, museums, etc., was performed mainly by arc lamps; and frequently independent arc lighters fed these through separate series circuits. The light was white and bleak, with occasional tinges of violet or blue, and the intermittent hissing noise was a drawback. But a 2,000 c.p. arc did provide a lot of light.

The standard of interior illumination was deplorably low compared with present practice. Houses were lighted by 16 c.p. carbon lamps in the main rooms, with 8 c.p. for bedrooms and frequently 5 c.p. for sculleries and landings. Flat rates between 8d. and 6d. per kW-hour or

. . . refused this proferred gold mine . . .

Board of Trade unit were almost universal. The 16 c.p. lamp cost 3s. 9d. in 1891, but the Edison and Swan master patents were nearing their end, and a great drop in prices followed the appearance of competing lamp makers.

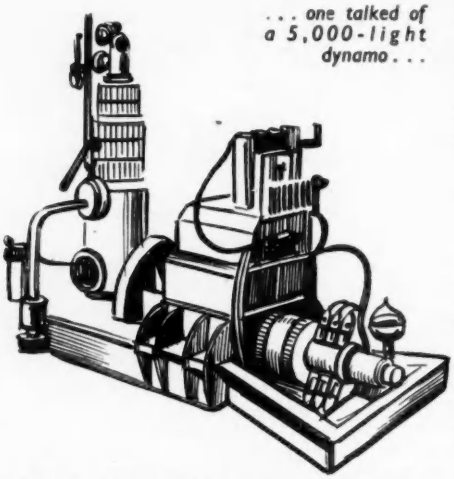
From Cotton-Wool to Candle-power

The making of their own patterns of glow lamps was taken up by several firms after the Edison-Swan master patents expired in November, 1893. The new makers were suspicious and competitive, but they all had the same occupational disease. They all set great store on strictly guarded secret processes. It was impossible for outsiders to enter the magicians' dens where these mysteries were practised. I was lucky enough to be on terms of friendship with Chris Wilson, the manager of the Robertson Lamp Works at Brook Green, Hammersmith, a G.E.C. offshoot; and with Robertson himself. It took years to break down the secrecy barrier, but ultimately I agreed to let their secret processes remain locked up so long as I saw the rest of the works. The result was that in 1901 the *Electrical Times* published the first description of glow lamp manufacture to appear in this country. In those days the lamps had carbon filaments, and I adopted the title "From Cotton-wool to Candle-power." Robertson and Wilson were delighted at the wide attention the article received from journals of all kinds here and abroad. They asked, and received, permission to reprint and to translate. For some years thereafter "From Cotton-wool to Candle-power" travelled the world in leaflet form and in many languages. The other lamp makers did not need supplications for permission to visit their works : they came to our doorstep.

London Leads

It sounds very fine to remark that at the end of 1891 there were twelve electric lighting companies in London; but their aggregate capital was less than £2½ million. The 24 provincial companies were still smaller fry; their combined capital did not reach £350,000. The municipal systems of the kingdom had invested only £230,000 in all.

A certain number of small companies operated without any Provisional Orders, distributing to consumers through overhead cables running from roof to roof of people who granted wayleaves over their property for a small annual rental. This was highly precarious, and the life of most overhead networks was short.



. . . one talked of a 5,000-light dynamo . . .

By far the largest of the companies in London was the Metropolitan : but its sales for 1891 yielded less than £38,000, and the units delivered were 1½ million. To conduct this small business the company had no less than one h.t. and five l.t. stations.

Clearly a service of electricity was beyond the reach of all but a small minority of the public. Even as late as 1896, when Ferranti went to live in a large house at Oldham, near his new factory at Hollinwood, Mrs. Ferranti had to deplore the lack of electric light and was condemned to use gas or oil.

The Big Men of 1891

Who were the leaders of the electrical profession in 1891? The acknowledged leader was Sir William Thomson (not then Lord Kelvin). He was regarded as our Moses, leading us to the promised land. In years a patriarch, no less than 67. Three years younger, but with a great white beard and thatch that rendered him a super Santa Claus, was Joseph Swan, whose name is still etched on many a lamp bulb. R. E. Crompton, who as a midshipmite tasted the trenches in the Crimean War, was always a veteran to me. He was 46, two years older than Edison, who in turn was four years older than the founder of this journal, Robert Hammond. J. J. Thomson, of Cavendish Laboratory and electron fame, was 35. Our opposite number to Edison, namely S. Z. de Ferranti, was only 27. The versatile Sir James Swinburne, who was then 33, is still happily alive. He is the wittiest man the electrical world has yet produced; and he delighted two generations with his sallies against professors and pomposity. Around the turn of the century he was the most welcome of contributors to our columns. I owe him gratitude for many an eleventh hour batch of sparkling "copy" received on occasions when the editorial task was mine single-handed during holiday absences of W. M. Madden, the then Editor. It is a privilege to count him as a friend.

The Nine Manufacturers

Electrical manufacturing was a happy-go-lucky business. The Stock Exchange Official List in 1891 gave only nine entries under the heading of Manufacturing Electrical Companies. It is pleasant to know that nearly all survive and flourish. They were the Brush, Cromptons, Electric Construction, Fowler-Waring Cables, India Rubber, Gutta Percha and Telegraph Works, International Okonite, Manchester Edison-Swan, Swan United Electric Light, and Telegraph Construction and Maintenance. The total subscribed capital was £1,108,541.

Quite a solid share of the heavy plant production was done by old-established engineering firms of high standing. It is probable that in many cases they did not seek the business, but had it brought to them because they possessed the manufacturing resources and the finance. Mather and Platt and John Fowlers of Leeds may be named as examples.

The smaller electrical firms were largely concerned with making instruments and accessories of their own invention. They formed family businesses, and raised their modest capital from relations or friends. Consider, for instance, Everett Edgcumbe's, R. W. Paul, Evershed and Vignoles, Nalder Bros. and Thompson, Veritys, Lundberg's. The General Electric Co. was a law to itself. It began by retailing or wholesaling everything electrical, then it took to making accessories and glow lamps, and gradually worked up into the heaviest branches of generating plant. And now look at it. The question is: what does it not make?

The First Electrical Association

The average central station chief was in his late twenties or early thirties, and he kept moving to bigger and bigger jobs. Municipal electrical engineers in particular were as mobile as fleas; no sooner had you noted their change from one spot to another than they were on the short list for a third town.

The municipal electrical engineer had many enemies. There were plenty of older officials anxious to be his boss. The gas engineer, already well dug in, wanted control so that he

could keep the new light in subservience to his gas. The water engineer pointed to his experience in laying mains; the borough treasurer fought to reserve the accountancy for his department; the town clerk was jealous of *his* prerogatives. Sometimes, between these people already on the spot, the unfortunate young electrical engineer was deprived of most of his functions except those connected with keeping the plant in running order.

Hence, when, through the initiative and exertions of our then manager, Mr. W. L. Madgen, we took a leading part in organising the creation of the Incorporated Municipal Electrical Association, and ran its first Convention in 1896, we did a good job of work for the hitherto defenceless late-comers to municipal life; and we were proud that our first Special Issue should have been devoted to so fruitful an accomplishment.

Slow Growth of Associations

With the two exceptions of the I.M.E.A. and the Cable Makers Association, always a prosperous section, no branches of the industry had formed Associations in the nineteenth century. Of the twentieth century lot the first-born was the Electrical Contractors' Association, formed in 1901. The National Electrical Manufacturers' Association, composed mainly of instrument and accessory makers, dated from 1905. 1915 saw the birth of the Electrical Wholesalers' Federation. An auspicious year was 1919, which produced the invaluable Electrical Development Association, and Elma, that live wire of the lamp industry; but even then they were five years old when the Electrical Association for Women made its bow. From almost the first this journal nagged the various sections of the industry, first to form their own associations and then to make friendly working arrangements with each other. It envisaged a pan-electrical republic in which each state received from and gave to every other state support and fair dealing.

Causes We Fought For

There were other causes for which we fought and fought. It is not too much to say that in the nineties and well into the new century the industry was bullied and dominated by the electric wiring rules of the Phoenix Fire Office. They were promulgated by Mr. Musgrave Heaphy, M.I.E.E., the electrical fire hazard expert of the Office, and formed the bible whereon the unorganised installation contractors meditated day and night. In vain did the I.E.E. issue its own wiring rules : unless you toed Mr. Heaphy's line you might not be able to insure against fire. The stock method was wood capping and casing. Wiring was expensive, but every attempt to bring down the cost by new methods was frowned on. Mr. Heaphy's invariable verdict was No. Not until 1909 did the Heaphy *régime* end. The 37th edition of the Rules was the last signed by him. His successor, Mr. Castle Russell, revised it drastically and in the 38th edition many of the methods we had advocated in our campaigns for cheaper house-wiring, including surface flexible wiring, were sanctioned for the first time.

One Battle Ends in Beama

To return to the N.E.M.A. Makers of heavy plant were not only suspicious of one another but afraid that if they joined they would be outvoted by what they regarded as the small fry already in the Association. The *Electrical Times* did its best to convert them. In my passings to and fro I acted as an unofficial friend of both parties, persuading the Council of the N.E.M.A. to proclaim their willingness to give up their seats to the big plant makers if these would come in; and interviewing the latter when opportunity served. The most obdurate die-hard I encountered was William Gray, one of the brothers who controlled the India Rubber, Gutta Percha and Telegraph Works Co., colloquially known as the Silvertown Company. Would that Robert Kaye Gray, the eldest brother of four and a Past President of the I.E.E., had fallen to my lot. He was a gentle-man (both with and without the hyphen), open to reason, courteous and indeed the best type of Victorian. But William, though his word was his bond, had suffered petrification of the opinions early in life.

When the campaign seemed to need an extra push I offered the N.E.M.A. a free 4-page tinted inset in the *Electrical Times* wherein they could set forth their case and their offer to the plant makers, and obtain publicity throughout the industry. They accepted with gratitude.

. . . *Pink Pills for Pale Manufacturers*

. . . No less than 81% of capacity was foreign . . .

When later I inquired for the "copy" the officials (honorary and part-time) asked whether I would kindly draft the whole thing. Not blind to the humorous side of the request I wrote enough to provide four pages of Pink Pills for Pale Manufacturers and had it printed on rose-coloured paper. It appeared in the *Electrical Times* of June 10, 1909. The culminating point was the election in September, 1911, of D. N. Dunlop as whole-time Secretary with a new constitution as well as the new name of Beama.

Saved by the 1914 War

When Dunlop joined Beama in 1911, he took in hand an industry that on the heavy plant side was afflicted with pernicious anaemia. The municipal cult of the lowest tender, plus the free-import (miscalled free-trade) policy that left us open in a tariff-ridden world to competition from Germany, France, Italy, Holland, Switzerland, Sweden, U.S.A., Japan, *et al.*, ensured that the British makers received only a fraction of the orders available from the home market, and then at prices cut to the bone. The deadliness of this foreign competition may be gauged from some figures we gave in 1908. A list of fifteen U.K. electric supply and traction systems had installed 108,000 kW of generating plant. No less than 81% of this capacity was foreign, and only 19% of home manufacture. Of these fifteen systems, eight were municipal, and included Glasgow and Manchester.

What saved the plant industry was the first World War. At the beginning of 1914 many of the heavy plant makers were dying by inches. Look at this list of concerns that at the beginning of 1914 had paid no ordinary dividends since the date given.

British-Westinghouse	1900	Ediswan ...	1908
Browett Lindley	1901	Electric Power Storage ...	1908
Bruce Peebles	1907	Richardsons Westgarth ...	1909
Brush	1906	Willans and Robinson ...	1900
Cromptons ...	1908		
Dick, Kerr ...	1910		

Luckily, the cable makers continued to flourish, through good times and bad, partly because their foundations were well rooted before the electric supply era began.

Government war money poured into the empty coffers of the electrical manufacturers from 1914 and they gave full value. They played an essential part in winning the war. For the first time in our first thirty years of life (1891-1921), the electrical industry began to receive respect from the financiers, and to attract the professional type of director who has a nose of a truffle hound for profit possibilities.

Swan Song

When I look back on these reminiscences, I am confirmed in an opinion induced by the lessons of history and by my own experience (or hindsight), namely, that foresight is the rarest fruit of genius. Whether in politics, in social relations, in science, or in any sphere of human thought or action, our medium- or long-range foresight is a blind man's buff at which the gods must laugh. Make a list of the predictions that have not come to naught within a century and the expectations that have not been disappointed within a like span. Search from the first syllable of recorded time, and your list will not diminish our famine stock of paper by a full pennyworth.

I am 81 and probably this is my swan song. I send my greetings to those of my electrical friends who are still extant. They, and the majority who have gone before, have showered on me an aggregate of kindness, understanding and good will that still warms the heart. Sometimes I think I must have seen the best side of most people I have met in the electrical world, or that electrical men are among the elect. Otherwise, how can one explain the frightful discrepancy between the estimate one forms of electrical humanity in the small circle accessible to one's own sight and hearing and that of humanity in the global mass?

Old age has its unexpected little consolations, and here is one that you, too, may enjoy in due course, although now it won't be unexpected. In 1947 I received a letter from the I.E.E. informing me of a Rule of Council that when a member of any class has completed his fiftieth year of membership he shall automatically cease to pay any further annual subscription, but he shall still be entitled in every respect to the privileges of a member. "You yourself have now qualified as your membership began in 1898."

May you, good reader, live long enough to qualify for a like exemption.

Our readers' views . . .

One-Sided Conference

WITH reference to "Frigid's" letter in your issue of October 18, I fully concur with his remarks about electric fires. There is a continual wrangle about the efficiency of electric fires and many parrot cries are raised, those in favour of them claiming 100% efficiency because there are no chimney losses or unconsumed fuel while the rabidly "anti's" state that their efficiency is as low as about 13%, i.e. one-half of the thermal efficiency of a power station on the basis of units generated.

Both parties, in their feverish efforts to blind each other with science, overlook the vulgar practical viewpoint. Admittedly a well-designed solid fuel appliance will produce more heat units than an electric fire for the same fuel consumption on a long term basis. But would anyone care to heat a small sitting room for half an hour during breakfast time with say one pound of coal? For short-term heating, the electric fire is actually more economical of the national fuel resources. Furthermore it utilises in the end, grades of fuel that even the present domestic consumer —used as he is to the Coal Board's more fire-resisting fossils—cannot hope to ignite.

LONDON *"Rigid"*

◆ ◆ ◆

IN your correspondence columns last week, "Frigid" says he does not see how the Minister is going to do away with the electric fire. Making their possession illegal, as your correspondent suggests would be an unwarrantable interference with the liberty of the subject—a thing unthinkable in these enlightened days. But there is nothing to prevent the Government appointing an Electric Fire Development Corporation to increase production of electric fires. That should kill them if anything would.

Having ensured the gradual demise of the existing electric fires either by arranging that supplies of resistance wire are diverted to other channels or requisitioning the factories hitherto devoted to the manufacture of spare elements. These could be changed over to casting ships propellers or some other activity closely akin to their original function. It would then only be necessary to dispose of the gas industry ina similar fashion to have—as your *Meteor* note in the same issue infers—solid fuel left triumphant. Then of course the matter is easy. One simply resorts to what Mr. Robens once referred to as "fuel cuts by under deliveries" and the problem resolves itself.

LONDON *"Sarcastiens"*

◆ ◆ ◆

Sodium Lighting

PERHAPS S. J. M. Beale may be forgiven for being puzzled as to why he finds sodium street lighting so much more satisfactory than any other form of illumination.

It has always seemed to me that the reason for the outstanding advantages of the sodium lamp have never had the publicity which I believe they merit. As one whose interest in the subject is strictly that of a "consumer", I should be delighted to see the experts explain these qualities, but in the meantime may I be permitted to outline what appear to me to be the salient features responsible for the superiority of sodium lighting.

(1) The light output, lumens per watt, is higher than other lamps.

(2) Surface brightness of the light source is comparatively low.

(3) The shape lends itself admirably to suitable reflector control.

(4) The light being of longer wavelength, and almost homogeneous in its spectrum, is not subject to the same degree of refraction, diffusion and absorption in the atmosphere.

(5) Most important of all, its colour is that in which the acuity of human vision is at its greatest. This is the point on which I think it scores most heavily over mercury, as in blue light our visual acuity is at its lowest.

J. & D. ELLISON LTD., COLNE *R. Whittaker*

◆ ◆ ◆

IN your issue of October 4, Mr. Beale seems to overlook the reason for the clarity of vision with sodium lighting. Not only is it nearer the red end of the spectrum and thus freer from absorption by mist or fog than is the bluish light of mercury, but it is practically monochromatic. Any lens—even one so accommodating as the human eye—will give a sharper image if it only has to focus light of one definite colour.

LONDON *"Monochrome"*

Reviewing the third B.E.A. Report

Do present tariffs divide costs equitably?

IF one were asked to pick out the most important single feature of the B.E.A.'s third report it would surely be the maintenance of stable financial conditions despite a rise in costs and a fall in average revenue per unit. This is no financial wizardry, it is simply a demonstration of the sensitiveness of this great concern to variations in electricity consumption, and, in consequence, load factor. Had the increase in units sold been last year's figure of 6·2% instead of the actual figure of 12·3%, the year's surplus of £6·3 million would have been turned into a loss. It was this accretion of sales of electricity that resulted in certain area boards, which had showed estimated losses when stating a case for increased charges, ending up with a reasonable surplus. It is clear, therefore, that with those costs outside the B.E.A.'s control continuing to rise, only continuing expansion in electricity consumption can prevent or limit further tariff increases.

Rate of Growth

It, therefore, becomes of paramount importance to ascertain the long-term rate of growth in consumption. Before the war a figure of 10% was commonly accepted as the annual increase, but more recently the B.E.A. has referred unofficially to annual increments of 7 to 8%. Over the past 30 years the average annual rate of growth has been nearly 9%. Unfortunately, this is not particularly helpful since in the changed economic circumstances, pre-war conditions may not be a satisfactory criterion also this span includes the major recession during the war years. On the other hand, in so far as the post-war years may be called normal, there are insufficient data to average out variations due to weather in order to determine the long-term trend. Neither must the impact of fuel rationing be overlooked. All things considered, it would seem that the pre-war figure of 10% may well apply to conditions in the next few years, certainly consumption continues buoyant at present.

In any conception of the future it must not be overlooked that the present is a time of restrictions, electricity no less than fuel. Apart from the limitations of display lighting, load shedding, both by voltage reduction and actual cuts, not only restricts the peak but also limits consumption. Herein lies a further potential increase in consumption as more plant becomes available, even though it may not be so remunerative by reason of the lower load factor.

Turning now to a consideration in the rise of costs, works costs for fuel and handling changes easily take the lead with an increase of 15·6%. Against this must be set the 11·5% greater coal consumption occasioned by the 13·1% increase in units generated, while coal itself was 13·6% higher at the end of the year than on April 1, 1950. It is disappointing to find administration and general expenses up by 10%, even though increases in salaries appear to be an important factor. It is noted that only 1·2% of the figure of 10% is attributable to new power stations and transmission lines. The cost of distribution increased by 8·1% and depreciation by 7·3%. As foreshadowed in the first report, the B.E.A. has introduced its own scale of depreciation rates; it is to be regretted they have not been published, for the former Commissioners' rates were of value beyond the immediate field of electricity supply.

In the engineering section an alarming situation is revealed by the increase in loss of generating capacity due to various causes during January, 1951, namely 14·9%. The improvement that took place in 1949 and 1950 has been lost and we are back to the 1947 figure. The major increase in lost capacity is in "other causes" which is stated as "largely due to teething troubles with plant which had to be rushed into commission to meet the winter peak loads." One cannot help wondering whether this was the sole reason for rushing commissioning dates. The figure of loss of plant for this reason was 4% compared with 2·1% in January, 1950, and 1·1% in 1947. In actual values the increased outage over the previous year was approximately 270 MW which is a sizable slice of the total plant commissioned in the year of 965 MW; it appears even more serious against the December commissioning figure of 295 MW. Effectively, therefore, the rate of commissioning for the year falls a long way below the 1,000 MW mark.

The general detail of the engineering section was dealt with in the abstract published last week, but one further matter deserves special mention here. In the 1955 (supplementary) and 1956 programmes a saving of approximately £1·4 per kW (1950 prices) is anticipated due to

economy in buildings, larger size of plant, simplification of auxiliaries, the drafting of more suitable specifications. This saving of 2½% in capital cost while not as great as many had hoped for is at least a substantial figure. In addition, by the use of space in buildings charged to earlier programmes and spare boiler capacity a further saving of £2·1 per kW will be made in those years.

The major part of the commercial section of the Report is devoted to a study of that topical and contentious subject of the control of consumers' load. This almost studiously eschews any optimism of the ultimate advantage to be gained; it is none the less a well reasoned statement, quite the best we have seen. There is considerable discussion of special off-peak tariffs or rebates, it even goes so far as to state : "In the new standard tariff structures the area boards are proposing to continue and extend this practice of offering attractive off-peak rates." Meteor has often written on just this point, but in standard domestic tariffs so far published by area boards, there has been no mention of such facilities.

One other erstwhile controversial topic of the commercial section attracts comment; it is the review of contracting and sale of fittings activities. Such remarks as are made on the subject both in the main report and in the supporting area board reports suggest an improvement in relationship with the general body of electrical contractors, but some of the mystery concerning the allocation of overhead expenses in this sphere of business remains. It is rather surprising to find that, while the direct cost component of the turnover varies only from 77·8% to 84·5%, with a weighted average value of 80·9%, indirect costs, which have a mean of 15% on turnover show the much wider range of 7·5% to 21·7%. Incidentally, the Board which charges the lowest rate disarms criticism with the assurance that contracting work is undertaken only in those sections of the area where pre-vesting authorities undertook similar activity.

An improvement in the appropriate statement of accounts is that the percentages just discussed are now clearly set out. Some other interesting ratios are not so apparent, and one of these is the proportion that contracting and sales profits make up in the overall surpluses. Calculating on a basis of net surpluses, before taking into account transfers to reserves, the contracting, etc., profits amount to 28·9% of the surpluses of all boards. When the figure is based on the consolidated net surplus of the Central Authority and the area boards it becomes 16·9%, underlining in a striking manner the importance of contracting in the delicately balanced finances of electricity supply.

Area Reports

Another matter of some importance soon noticed by a close student of the area reports is their wide variation in style and content. The Electricity Act, 1947, calls for such reports to be made to the Central Authority. They must detail for each of the boards "the exercise and performance by them of their functions during

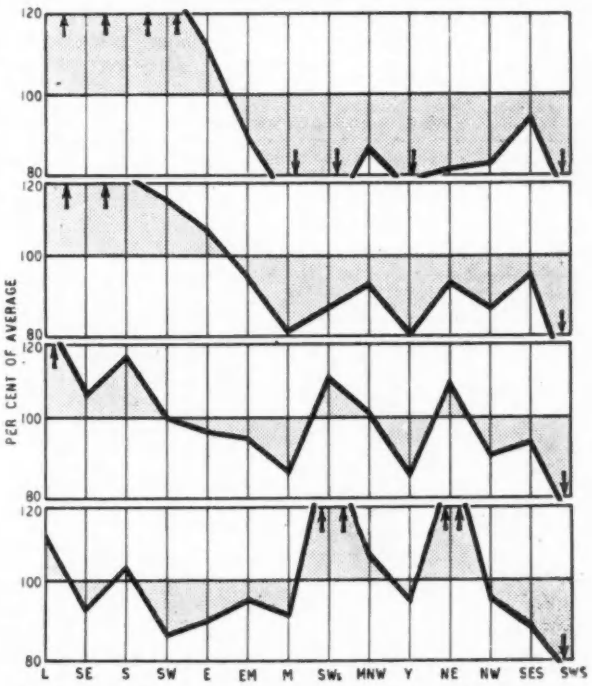


Fig. 1. These four curves show variation of area board expenses on a basis of cost per notional unit. From top to bottom, the notional units used equal total units non-industrial plus a half industrial, non-industrial plus a fifth industrial, and finally, non-industrial units only. Their significance is discussed overleaf

that year, and on their policy and programmes." Some of the reports published are as dry as this wording would suggest; others are written with a more apparently "human" touch, directed only incidentally to the Central Authority, their main aim being to enlighten the consumer. In many ways this latter type is preferable, for the very full statistical appendices enable most of the formal information required to be found readily, and the more chatty style gives a fuller impression of the board's outlook.

Analysis of Expenses

Readers may recall that in our review of the second B.E.A. report we considered in some detail the reason for the sharp division in the expenses per unit between boards south of a line drawn between the Severn and the Wash, and boards north of it. A major factor in these higher costs in the south was shown to be the fewer units sold per employee. In searching for a reason for this fundamental difference it was indicated that there was an approximate similarity in the shapes of the curves of expenses per unit and the percentage of non-industrial units sold. Here, perhaps, we should explain that expenses were taken to include distribution, rents, rates, administration, depreciation, etc., but not the cost of bulk supply nor interest. Non-industrial units include domestic, commercial and farms, while industrial units are taken to include public lighting and traction, though the amounts of these are not significant.

The parallel between the percentage of non-industrial units and expenses per unit suggested that the major reason for the sharp differentiation in costs above and below the Severn-Wash line lay in the substantially higher expenses associated with non-industrial units when compared with industrial. Accordingly, an investigation has been made with a view to assigning a numerical value to this ratio. The natural variations in performance which occur between area boards in respect of their geography, efficiency and characteristics inherited from the former make-up of the industry, prevent any direct mathematical approach to the problem and accordingly an experimental method has been developed by the use of a series of notional units.

Notional Units

Four curves shown in Fig. 1, are drawn in the convention we introduced and explained last year. The first shows the expenses per unit, the

RELATIVE RESULTS AND PERFORMANCES OF AREA BOARDS

	Population /sq. mile	1 Domestic units/ head	Industrial units/ indus. cons. '000	2 Distribution d./kWh	3 Administration d./kWh	Revenue d./kWh 4 Domestic	Power	5 Total	6 Contracting and sales of fittings Indirect costs %	Surplus %
London ...	**20,400**	**429**	**29·9**	**0·191**	**0·182**	**1·68**	**1·38**	**1·56**	**15·4**	**2·9**
	20,400	378	27·4	0·168	0·161	1·77	1·39	1·63	15·2	3·4
S.E.	**1,040**	**453**	**76·1**	**0·154**	**0·166**	**1·54**	**1·13**	**1·43**	**17·9**	**3·7**
	1,030	403	67·1	0·172	0·168	1·61	1·15	1·48	18·6	1·2
S.	**575**	**380**	**92·5**	**0·142**	**0·149**	**1·62**	**1·25**	**1·48**	**17·0**	**2·4**
	571	332	82·9	0·152	0·158	1·69	1·24	1·52	15·8	3·3
S.W.	**382**	**408**	**63·8**	**0·138**	**0·181**	**1·52**	**1·12**	**1·41**	**21·7**	**0·1**
	379	364	60·9	0·147	0·191	1·55	1·12	1·42	22·8	0·8
E.	**610**	**445**	**92·8**	**0·126**	**0·156**	**1·48**	**1·08**	**1·32**	**14·9**	**3·4**
	604	390	86·2	0·133	0·168	1·55	1·06	1·35	15·2	3·4
E.M.	**590**	**381**	**107·5**	**0·106**	**0·085**	**1·36**	**0·93**	**1·12**	**12·9**	**7·1**
	582	348	97·3	0·107	0·091	1·41	0·93	1·15	12·3	6·8
M.	**810**	**449**	**133**	**0·079**	**0·094**	**1·36**	**0·88**	**1·07**	**15·4**	**4·3**
	800	393	121	0·090	0·096	1·41	0·88	1·09	17·5	2·9
S. Wales ...	**436**	**301**	**573**	**0·094**	**0·092**	**1·54**	**0·73**	**0·92**	**14·3**	**1·6**
	435	263	506	0·092	0·093	1·59	0·73	0·94	13·5	4·3
M. & N. Wales	**601**	**364**	**261**	**0·113**	**0·083**	**1·44**	**0·86**	**1·09**	**17·1**	**2·5**
	599	329	219	0·121	0·089	1·47	0·84	1·09	19·2	1·1
Yorks	**1,026**	**408**	**174**	**0·083**	**0·074**	**1·36**	**0·79**	**1·01**	**12·0**	**6·8**
	1,016	366	166	0·082	0·078	1·38	0·78	1·01	9·4	6·1
N.E.	**527**	**263**	**356**	**0·094**	**0·088**	**1·53**	**0·78**	**1·01**	**7·5**	**8·0**
	525	241	345	0·095	0·094	1·55	0·79	1·02	9·3	10·7
N.W.	**969**	**452**	**149**	**0·101**	**0·104**	**1·38**	**0·90**	**1·11**	**12·3**	**5·7**
	962	414	134	0·102	0·098	1·41	0·89	1·12	13·1	4·2
S.E. Scot. ...	**427**	**318**	**180**	**0·106**	**0·091**	**1·39**	**1·00**	**1·20**	**15·5**	**6·7**
	425	278	128	0·092	0·094	1·45	1·00	1·23	15·2	7·4
S.W. Scot. ...	**518**	**337**	**358**	**0·094**	**0·070**	**1·13**	**0·97**	**1·05**	**12·2**	**4·9**
	518	299	347	0·092	0·069	1·16	0·95	1·05	8·3	7·4
B.E.A. Total	**710**	**398**	—	**0·115**	**0·115**	**1·46**	**0·93**	**1·19**	**15·0**	**4·1**
	708	355	—	0·120	0·119	1·52	0·93	1·21	15·1	3·9

***Bold figures refer to the year** 1950/51, light figures to* 1949/50. (1) *Including farms;* (2) *Operation, repairs and maintenance;* (3) *Including general expenses;* (4) *Including commercial and farms;* (5) *Excluding inter-area sales;* (6) *Based on total sales.*

second expenses per notional unit of non-industrial plus half industrial units, the third is similarly based on non-industrial plus one-fifth industrial units and the final curve shows expenses per domestic unit only. All four curves are plotted as a percentage of the mean figure so as to be directly comparable.

An interesting feature which emerges from these curves is that better co-relation is obtained between boards for expenses per non-industrial unit than for total units sold. It is clear, however, that the best co-relation of the four is for the notional unit of non-industrial plus one-fifth industrial. Curves for intermediate notional units have been drawn but owing to the varying nature of the spread it is not possible to define with certainty the curve of closest agreement. It appears, however, to be between one-fifth and one-seventh industrial units, and this was confirmed by curves based on corresponding figures for the previous year. It, therefore, seems to be clear that expenses resulting from the sale of non-industrial units are five to seven times greater than for industrial units.

We feel that a closer approach to a definite ratio of cost cannot be made without considering the differing characteristics of the individual boards. Thus no account has been taken of the units sold per industrial consumer which range from 30,000 units in London to over half a million in South Wales. An unusual feature also is the persistent low figure in all four curves for the South-West Scotland Board.

Relative Cost and Revenue

It must be remembered that we have disregarded in these figures interest and the cost of purchasing electricity. The former is relatively unimportant, but the latter is the major component in the total costs of area boards. Its omission avoided the complicating factor of the varying fuel cost adjustment which is outside the boards' control. Nevertheless, in any ultimate analysis these costs must play their proper part.

Before any further study of these figures can be made, it is necessary to know the load factors of industrial and non-industrial consumers for each area board. Since these are unobtainable we have, rather glibly perhaps, assumed them to be equal for the purposes of these valuations. Then choosing five as the ratio of expenses between non-industrial and industrial unit costs, since it is the minimum value shown in the previous analysis, we have calculated the ratio of total costs of non-industrial and industrial units for each area board. The figures are plotted in Fig. 2. A second curve has been drawn of the ratio of actual revenue per non-industrial to industrial unit, as given in the Third Report. These curves show that the spread of the actual ratios is much wider than the calculated, suggesting that actual tariffs do not reflect true costs. The average ratio of both curves is 1·56. In any comparison of the two curves, however, the basic assumptions for the calculated curve must be kept in mind and also that the quantity plotted is a ratio. Nevertheless, the two curves suggest that while in the South Wales, Yorkshire and North East areas the industrial consumer is paying less than the properly equated cost, the reverse is the case below the Severn-Wash line and Scotland.

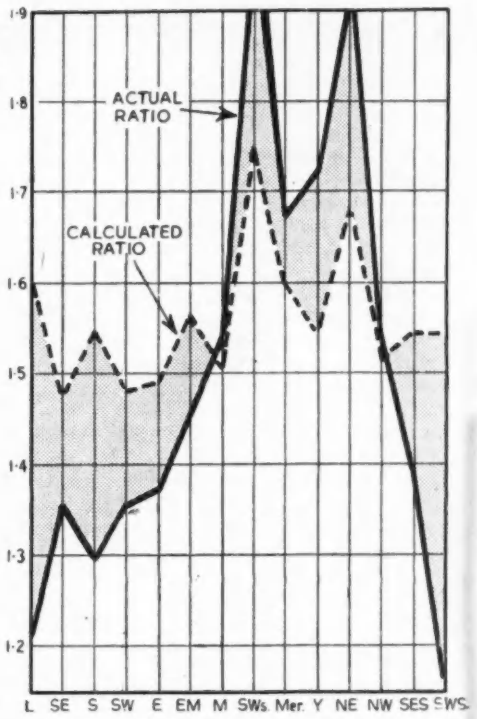


Fig. 2. Ratio of charges for non-industrial and industrial units

In presenting these views to our readers we have tried to indicate a line of investigation that might usefully be conducted as a guide to those whose task it is to frame tariffs. The subject is one of almost infinite complexity and in consequence demands more time and application than is possible in a busy editorial office.

Grid Operation

An Account of Experiences on a Winter's Day

THE following account of Grid operating conditions on a winter's day has been taken, because of its interest, from the B.E.A. Report. To appreciate fully the circumstances which arose, the reader should preferably have a map of the Grid such as is given in the *Electrical Times Electricity Supply Handbook*.

The day selected was Thursday, December 14, 1950, when the weather was somewhat more severe than usual. The peak demand on the system occurred in the half-hour ended 8.30 a.m. and amounted to 13,083 MW with a capacity available of 11,030 MW, giving a total shortage of 2,053 MW or 15·7%. In the Northern Area the shortage—including Scotland—was 19·1% against 13·1% in the South. Load shedding was extensive in both areas, and was heavier in the North despite the flow of power northward on the two connecting circuits Peterborough-Bourne and Meaford-Crewe, which at one time reached the dangerously high level of 150,000 kW. A trip on either line in these circumstances would have overloaded the other, which would in turn automatically disconnect, and the North and South Areas would then have been isolated. This is known as cascade tripping.

After 8.30 the demand decreased, particularly in the South, and by 9.30 a.m. nearly all supplies had been restored in this area. In the North, however, load shedding continued throughout the morning and at 11.30 a.m., for example, amounted to 387 MW. No assistance could be provided from the South as the power flow was still running at more than 100,000 kW.

Just before, and at, midday the usual drop in industrial demand occurred in the North, and all supplies were restored except in Scotland, where some load shedding by voltage reduction was maintained. The load, however, increased in the South and the power flow sharply reversed, putting such a load on the Warrington-Percival Lane and Lockfields-Birkenhead circuits that danger of cascade tripping arose. Generation in the North was therefore reduced at 12.10 p.m., despite the fact that load shedding by voltage reduction was now operating in the South.

Power supplies were also reduced in the North at 12.30 p.m. due to the shutting down of the hydro plants in Scotland in order to conserve water. This involved a deficit of about 180,000 kW, and the Scottish Area then became importing to the extent of 110,000 kW. Once again danger of cascade tripping arose on the Carlisle-Dumfries and Galashiels-Portobello circuits, and load shedding had to be undertaken by voltage reduction.

After the Lunch Break

Industrial demand from the North rose suddenly at 1 p.m. and the combined import by Scotland and North-east England rose to over 150,000 kW. Again the risk of cascade tripping appeared, this time on the Norton (Middlesbrough)-York and the Lancaster-Natland (near Kendal) circuits. Load had therefore to be shed in North-east England at 1.03 p.m., although by this time there was an ample surplus of generating plant elsewhere.

The bulk of the industrial load reappeared at 2 p.m., and by 2.40 p.m. northward flows on the Blackburn Meadows (Sheffield)-Wakefield and the Lincoln-Grimsby circuits totalled 155,000 kW. This had to be rapidly reduced by shedding load at suitable points in Yorkshire and Lincolnshire, and North-east England.

Demand, however, continued to rise in Scotland and North-east England and further shedding was required at 2.55 p.m. and again at 3 p.m. This was to maintain safe loadings on the Norton-York and Lancaster-Natland circuits. During this period there remained surplus capacity in the South which could not be used as Meaford-Crewe and Peterborough-Bourne circuits were fully loaded.

However, relief was afforded by the Scottish hydro-electric plants which came into operation at about 3.30 p.m., and by 4 p.m. Scotland was exporting some 50 MW. The coming of darkness, however, cancelled this out to a large extent and heavy load shedding involving all parts of the country began. The total reduction of load by this means was 1,943 MW, and the potential demand reached a maximum of 13,112 MW between 4.30 and 5 p.m. By 5.30 all load had been restored in North-west England, North Wales, Central England and Yorkshire, but the heavy domestic demand in Southern England kept complete restoration back until 6.15 p.m.

Scotland, too, suffered as the need to conserve water for the following day was met by shutting down the hydro plant at 6 p.m.

So ended one day's Grid operation.

Sixty Years of Trams

The Rise and Decline of the Tramcar in Britain

SIXTY years ago, on October 29, 1891, a week after the first issue of *Lightning*, now the ELECTRICAL TIMES, a notable event occurred in Leeds when the first overhead trolley-wire tramway in the British Isles was officially inaugurated. This pioneer installation, known as the Roundhay Electric Tramway, consisted of about two miles of double track and about half a mile of single line running to the car depot and power station site.

Six single-deck cars, built by Messrs. John Stephenson and Co. of New York, formed the original stock, the installation being carried out by the International Thomson-Houston Co., which supplied the tramcars, the overhead line and the power station plant. A report in a local paper at the time refers to the high-speed steam engine belted to two Thomson-Houston "80 h.p. motor-type dynamos." The tramcars were fitted with two 15 h.p. motors, had accommodation for 22 persons, were upholstered and had five incandescent lights.

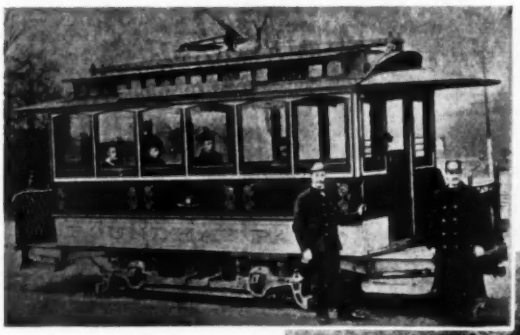
The introduction of the trolley type tramcar into Great Britain marked the beginning of a period of rapid expansion of tramways, and B.T.H. played a prominent part in this from the beginning. During the period 1896-1900, B.T.H. equipment was supplied for more than twenty tramway installations, including Bristol, Dublin, Glasgow, Leeds, Liverpool, Manchester and Sheffield. The success of the first tramcars at Leeds resulted in an order for 50 cars being placed in 1898, when Leeds Corporation was busily engaged in extending the tramway system throughout the city.

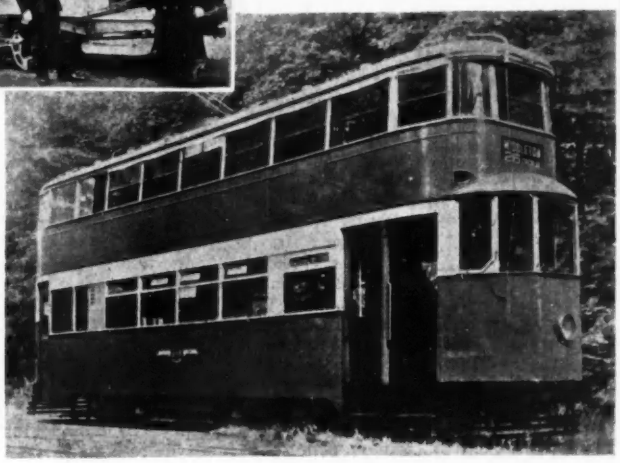
First Trams

The first dual-gauge tramcars in the world were used in 1907 to connect the two tramway systems of Leeds (4 ft 8½in. gauge) and Bradford (4 ft gauge). Special trucks were used with wheels arranged to slide over fixed axles. The wheels were locked in position for normal running, but were released and allowed to adjust themselves to the alternative gauge by moving over a short length of taper track connect the two systems.

It should be noted that Leeds also pioneered the trolleybus in Britain when a trial installation, carried out in conjunction with one at Bradford, was made in 1911.

In the ten years following the pioneer installation at Leeds, tramways in Britain increased until electric cars were operating over approximately 4,000





Above is seen one of the original tramcars to run on the Leeds system in 1891. On the right is one of the "Feltham" tramcars purchased from London Transport which after being overhauled and repainted have taken on a new lease of life at Leeds

route miles. This expansion was all the more remarkable, since there was a tenfold increase in route miles in four years from about 400 in 1897 to rather more than 4,000 in 1901.

From then until 1914 the tramcar continued to enjoy great popularity, and over 13,000 cars were in service at that date. Up to that time, the tramcar was virtually the only public service vehicle available.

Decline

During the last 25 years the tramcar has had to face competition from the trolleybus and the motor bus, and it has lost very much ground, particularly in Great Britain. It is a mistake to think, however, as many people do, that the tramcar is an outmoded form of transport. It is true that many tramcars were allowed to continue in service for 30 or 40 years and even longer, by which time they had become obsolete in design and performance, even though they were not worn out. It is true also that, in certain towns where traffic was light, the trolleybus and motor bus offered cheaper alternative forms of transport.

In spite of the decline of the tramcar in many places in Britain, it is still being used with great success in some of our largest cities, such as Glasgow, Edinburgh, Sheffield and Leeds. The latter city can rightly boast of its long association with the electric tramcar, and B.T.H. is proud to have had a share in the equipment of tramcars in Leeds right down through the years. Of the tramcars still in operation there, 50 were equipped by B.T.H. in 1930 and, in spite of 20 years' service, these cars and their equipment are still in excellent condition and good for a further period.

The B.T.H. association with Leeds has been further strengthened recently, following the purchase from London Transport of the 1930 "Feltham" type tramcars rendered redundant by the closing down of tramways in London. B.T.H. originally equipped 54 of these cars, which, after a general overhaul and repainting, are taking on a new lease of life with Leeds City Transport.

I.E.F. Radio Section Address

Radio Links in Telecommunication Networks

RADIO link development and operation formed the subject of the Radio Section chairman's address delivered last week by Dr. D. C. Espley. The main question he posed was what were the special qualities of radio networks which could be expected to provide better facilities in one way or another as alternatives or additions to cable networks.

Dr. D. C. Espley

At first sight it would appear that radio repeaters could present the "universal" features of a coaxial-cable repeater. However, in practice, radio repeaters had not been so amenable to feedback treatment with the result that two styles had appeared. These were a linear type suitable for television signals or for frequency-division-multiplex frequency-modulation, and a non-linear type normally used for a variety of pulse modulation arrangements.

In one way or another, bandwidth and power requirements still dominated system design, but the old problem of band reduction was under attack. If intelligibility alone was considered, considerable bandwidth reductions were possible, but when quality, such as was required in television, was needed, the difficulties became complex.

The frequency bands available for radio trunk circuits were limited, and in the selection of frequencies attention had to be paid to propagation functions such as fading, and to the availability on the higher frequencies of valves. Aerial design and positioning were also of great importance, and this subject was dealt with at length.

Operation

As radio trunk repeaters would probably be run on an unattended basis, a desirable objective was to reduce visits to the equipment to those carried out as a routine. The whole problem of the detection and replacement of defective equipment required much further study in the field.

Remote station power supply represented one of the largest problems. Grid power, with diesel-electric standby, was a good choice in developed regions, but diesel-electric plant was not without difficulties when it was associated with frequent automatic starts and non-specialised maintenance.

The address concluded by giving some of the economic factors involved in the construction of radio links.

Railway Electrification at 50 c/s

Traction Conference Papers read at Annecy

ONE of the factors which has proved most powerful in holding back railway electrification in Great Britain has been the number of possible systems available. This has resulted in considerable discussion, several comprehensive and expensive reports, and much unavailing argument. Fortunately the die has been cast in this country by the last Report of the Cock Committee, and 1,500 V d.c. is now generally accepted as most suitable.

Abroad, however, where conditions are much different, the situation remains in a state of flux and the arguments pro and con still rage. This was exemplified by the Conference on 50 c/s traction held at Annecy recently.

Situation in France

This Conference was held by the S.N.C.F. (French National Railways), and in order to appreciate the general situation the following facts are of importance. First, much of the natural power in France is being derived from hydro resources, which by their location involve a large high voltage transmission system, and this type of power is being rapidly exploited. Secondly, the rail density is not as great generally as in this country, and long hauls are the rule. Thirdly, many of the lines have steep gradients and run through narrow valleys and long tunnels, the latter leading to a considerable proportion of single line working.

The French have already considerable experience of 1,500 V d.c. working and found it most successful: it was thought, however, that with the development of the h.v. network it would be preferable to use h.v. (20 kV) single-phase 50 c/s a.c. over part of the system to cut down the installation costs and to avoid numerous substations. Work has therefore been going on for some time to this end and much of it was described in the papers presented at Annecy.

Types of Locomotives

M. Parodi, presenting the first paper, reviewed the whole subject generally. One of the primary objections to single-phase a.c. working was the unbalance forced on the three-phase distribution system. This objection had been raised 30 years ago and two solutions were readily available. One was to use Scott connected transformers and sectionalise the catenary system; the other was to use rotating three-phase to single-phase converters at the substations.

As far as the locomotives were concerned, there were four possibilities. These were: (1) to have a single-phase tapped transformer which would feed a.c. to low voltage, commutator type compensated traction motors; (2) to fit the locomotive with a transformer, a mercury arc rectifier and use d.c. traction motors; (3) to use a rotating single-phase/three-phase converter and use three-phase traction motors; and (4) to use single-phase to d.c. rotating converters and d.c. traction motors.

After reviewing the development of these systems he concluded that the improvements in the last 30 years had made these systems economically sound, and that substantial savings could be made by using 50 c/s single-phase current as far as the installations were concerned. The saving on rolling stock was, however, less obvious.

Advantages of 50 c/s

M. Garreau pointed out that the main saving fell in the primary substations, which could be separated by 50-70 km (31-53 miles) and which would only contain simple transformers with their associated equipment. The size of the main distribution system feeding these stations should, he thought, be sufficiently great to accept unbalances of from 10-20 MW without difficulty. The classic method was, of course, to use Scott transformers as had been done on the Annecy system.

Coming to the catenary system, the voltage drop on a section some 40 miles long was considerable. Experiments, however, carried out on introducing series capacitors at intervals to improve the voltage regulation had been successful. There were no important problems to be overcome on the civil engineering side nor in the design of catenaries.

Economically, comparing the single-phase system with the 1,500 V d.c. system, he estimated the savings in the former on installation alone, as 38-39% compared with the latter.

In the past, commutation difficulties had held up the single-phase motor: now these motors could be built up to 1,000 h.p. 50 c/s. A further advantage of 50 c/s was that the transformer was much smaller than with

16⅔ or 25 c/s and therefore more room was available for the motors. He thought that it was more difficult to build d.c. motors for 1,500 or 3,000 V working than single-phase motors of smaller power and lower voltage and that the maintenance was about the same. Fifty c/s was also advantageous in locomotives using rotating conversion and mercury arc rectifiers as again the machines and equipment were smaller than that used for 16⅔ or 25 c/s.

Less enthusiastic was M. Nouvion, who had no complaint against the 1,500 V locomotive with its good overload and shock resistant characteristics. He did not think the 3,000 V unit was as good as it was less powerful and less flexible than the 1,500 V engine.

Single-phase locomotives frequently used 16⅔ c/s and they had better adhesion properties than most. Although they had bad commutation troubles in the past, they were still working. Now we could produce a 50 c/s machine with a performance which could rival the best 16⅔ c/s unit.

He still, however, believed that the 1,500 V d.c. system was the best when the terrain was comparatively flat.

Detail Papers

The remaining papers were mostly concerned with specific details of the project and have, therefore, been dealt with at very short length. M. Chappée covered the basic theory of unbalanced networks in some detail using symmetrical component analysis, and did not consider that direct unbalance by using single-phase transformers across the existing h.t. network was really a suitable method. M. Labadie described in some length the substation at Annecy. This system, which is largely experimental, uses Scott connected transformers.

M. J. Walter went into the question of the track equipment, the overhead lines and telephone and signalling difficulties, while M. Bernard had some words to say on the subject of voltage drop. The same subject was dealt with to a certain extent by M. Gastine, who described various methods of avoiding or compensating for this. These were on-load tap changers or regulators which could be used either at the feeding points or to a lesser extent in the locomotives. A more interesting system, however, was the introduction of capacitors either in parallel or in series with the line. The latter of these two had proved most attractive where only distantly spaced feeding points were available.

Capacitors were also covered by M. Barboutan, who described the actual series installation on the Annecy section. Four sets had been introduced. These consisted of two units of 320 kVAR, 760 V at Albens; two units of 160 kVAR, 380 V at Bloye; two units of 160 kVAR, 380 V at Rumilly; and two units of 320 kVAR, 760 V at Marcelaz. In these installations the capacitors were short-circuited by resistances of 13·3 ohms for the 380 V units and 26·6 ohms for the 760 V units. The 13·3-ohm resistances were rated at 3 kW and the 26·6 at 6 kW. Three functions were performed by these resistances. First, they discharged the capacitors for maintenance or line disconnection. Secondly, they damped out oscillations which might occur due to the LC characteristics introduced; and thirdly, they provided a discharge path for d.c. static which might build up.

Supply problems formed the subject of M. Bernard's paper, who regarded the rotary converter-powered loco as the best.

Commutator Motors

M. Gaide had some words to say on the basic design of the single-phase commutator motor. The main trouble lay in the induced current flowing in the short-circuited turns under the brushes. Compensation could be provided, but this would only operate over a small range of speed. To cut down the sparking, it was essential to reduce the flux density to a minimum; the actual working voltage, therefore, had to be reduced to about 230, and the horse-power per pole limited to about 30. Thus a large number of poles were required (usually 16) and the diameter of the motor became in consequence much greater.

Despite this increase in diameter, the weight of the machine was less. They could, therefore, use either two motors per axle or make a machine with a double armature. The p.f. was about 0·89 at 70% maximum speed and the efficiency about 84%.

M. Tessier dealt with the performance characteristics and the Ganz single-phase to 3-phase conversion and M. Maigne with brush wear which he did not think excessive. M. Leyvraz of Oerlikon, however, said that 50 c/s brush wear was 2 to 3 times higher than 16⅔ c/s and 10 times as high as the d.c. motor. He thought, nevertheless, that the problem of commutation was practically solved.

M. Dlondet dealt with rectifier driven motors which really received unsmoothed d.c. and described modifications to make them suitable for this service and M. Muller of Brown Boveri detailed the construction of a mercury arc rectifier for traction use.

Mr. F. J. Lane

I.E.E. Measurement Section Address

—Metering Large Power Transmission Systems

THE problem of practical metering of large power systems formed the subject of Mr. F. J. Lane's chairman's address given to the I.E.E. on Tuesday last. He began by covering the general position of measurement in the supply industry, starting with research. In this case the measurement was involved in such investigations as those on the effect of atmospheric conditions on insulators and overhead-line conductors, the estimation of corona levels and radio interference, the determination of characteristic impedances and losses of lines and cables, and the exploration of the noise problem with transformers.

Design

In the design and production fields, there were three classes of tests generally recognised as necessary: type tests to prove the design and routine, and sample tests to check uniformity of production. Of these, routine checks presented no serious difficulty. They should not be of such severity to damage the apparatus concerned, but must be sufficiently searching to reveal any serious errors in construction or in the quality of the material. Sampling tests represented a simplification of routine testing where production was on a large scale.

Type tests were, however, more subject to discussion. One factor which had led to an important change was the growing appreciation of the importance of safeguarding against surge conditions such as were set up by switching on by atmospheric conditions. This involved much investigation into the clearances needed and the insulation levels. Another important class of type testing was the short-circuit testing of circuit-breakers. Oscillographic recording of the many quantities involved in this form of testing had reached a high degree of perfection. Although short-circuit duties were not difficult to calculate, there was very little factual information about conditions which were actually experienced in service. Some such data could be obtained from the high-speed ammeters which were now being included in every 132 kV transformer neutral, and the wider installation of Masson perturbographs should permit of further analysis.

Measurement in Operation

In the early days of the industry when full-load conditions were rare, the ammeter was able to indicate the thermal margin available between operating and full load conditions. Present-day complexity of networks, however, led to the conclusion that the better guide was transformer temperature, and much work had been done on devising satisfactory indicators.

The operation of the Grid as a single unit had caused considerable attention to be paid to centralised measurement. There were now eight Area Control Rooms, each responsible for the detailed operation of the system in its own part of the country, and one National Control Room responsible for co-ordination of the Area Controls and inter-Area transfers. The equipment in use at the moment was, however, getting old and was becoming difficult to maintain or extend. It had therefore been decided to replace all the control room equipment within the next five to eight years.

A description of the system to be adopted was then given by Mr. Lane. The "send-out" active power and reactive power of each generating station over 20 MW capacity would be transmitted to and indicated on a "loading desk" at the control room for each area. Summation equipment would then give total area generation to National Control.

On the loading desk also would be indication of the net inter-Area transfers of active and reactive power. Instruction devices would allow Area Control to see the last instruction given to the power stations, the present response and the available generating plant. On a loading wall-diagram feeder flow will be displayed in terms of MW or MVAr.

Finally, the chairman commented on devices for routine testing of insulating materials and bushings, and referred particularly to the fault-location system using reflected-pulse techniques which had been successfully demonstrated both in this country and abroad.

Problems and Practice

IN ENGINEERING

Lost Excitation

IN the problem under the above heading the relevant information seems to be given in the last sentence, which says the armature was changed next day for bad grooving. That means, I presume, the exciter commutator, for bad commutation or faulty brush pressure would give a fluctuating excitation. The d.c. injected into the rotor for synchronous running has to be passed through the equivalent resistance of the rotor, and when synchronism is attained the fields of the stator and rotor coincide. There is a minimum d.c. excitation which takes over the excitation of the motor, and when load is applied the d.c. in the rotor must supply both excitation and load current for the rotor currents to become of zero frequency or d.c.

The bad commutation or faulty brush pressure would prevent the motor from synchronising, especially when load was applied. The charge engineer probably recognised this and was running the motor on reduced load until the necessary repair to the exciter commutator could be carried out.

There is another possibility, that of a low supply voltage, which causes excessive slip whilst running synchronously, and may have necessitated a heavier d.c. excitation to pull itself into synchronism. This may be due to load shedding by voltage reduction and, if so, a higher transformer voltage tapping may be necessary.—*T. H. Snelson.*

Break for Lunch

THE following incident may awaken memories of some of your readers who remember the old open type of d.c. motors of the years 1900 and on.

I was called to inspect a 5 h.p. 500 V d.c. motor of the old open pattern installed in a wine bottling store. The motor had been running for some years free of all trouble. The owner complained that the motor ran perfectly from 8 a.m. until about 12.30 midday. and then would spark sharply, sometimes racing and tripping out or blowing the fuses, but would always start and run properly again after the dinner break. Suspecting an earth or short in the field circuit, I tested same for insulation and obtained a good reading, then checked the volts across the field coils and obtained a fair balance between all coils.

This test was taken at 8 a.m. with the motor cold before starting work. At this stage, the owner, who was watching the test, stated that the motor never failed until dinner time. In view of this and the results of my test, I started up the motor and left it at work, calling back to inspect at about 11.45 a.m. The motor was running very well and I sat near it and waited. At approximately 12.30 the motor started to race and spark sharply. Suspecting a weak field I switched off and applied the same test, and found one field circuit zero to earth. What had really happened was that the field coil connections were of the old bare lug pattern and a belt fastener of the Jackson pattern was embedded in the thick oil and dirt lying between the bottom field coils and frame, and when the motor was cold the oil was solidified and kept the metal fastener just clear from the frame, but after some hours of running, the field coils and motor warmed up and thinned the oil, the metal fastener then touching the frame. During the dinner stoppage the oil thickened and moved the fastener clear. The motor would then start up and run well until the cycle of time, heat and trouble started again.—*A.V.J.*

Bucket Elevators

CONSIDERABLE damage can be done due to failure of the links used in bucket elevators, resulting in complete collapse of the entire elevator. In order to reduce the possibility of failure the writer introduced an observation door of sufficient size in the elevator casing and placed at a suitable height above ground level. In this way the coal elevator attendant was able to watch the operation at frequent intervals, and note any defects.

In another installation of medium capacity each bucket throughout the entire length of the elevator was connected by means of a wire rope to minimise the possibility of complete collapse. The elevator was of an old type, but it was a cheap and simple way of ensuring reliability and gave many years of extended life to this plant.—*M.I.C.E.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates.

High Voltage and Education

Two Subjects for Three I.E.E. Chairmen's Addresses

OIL-FILLED cables were discussed in an interesting manner and at some length by Mr. A. L. Ashton, B.SC.ENG., M.I.E.E., in his Chairman's Address to the Southern Centre of the I.E.E., which was delivered at Portsmouth early this month. After briefly describing the history of this type of cable for 66kV and 132kV working, and noting that there were at present 1,650 feeder miles in operation in the world, Mr. Ashton went on to consider the hydraulic theory and design of such cables. In present practice the minimum permissible pressure is fixed at 2 to 3 lb/sq in., whilst maximum pressures vary between 30 and 75 lb/sq in. under static conditions, with a rise to well over 100 lb/sq in. during load changes. The transient maximum pressure occurs when switching full load onto a dead cold cable, and the minimum transient when switching off all load from a cable carrying about 75% of full load. Static pressures are, of course, largely determined by route contour.

The original oil-filled cables were fed by flexible walled tanks operating at atmospheric pressure. Various disadvantages existed and so a change was made to pressure tanks consisting of oil containers accommodating a number of sealed gas-filled cells. These later compress and expand in accordance with pressure conditions in the cable. The total gas volume of the pressure tanks is determined by the total oil expansion of the cable and the maximum static pressure permissible, but the distribution of the tanks on the cable route is entirely a function of transient pressure conditions.

Operation

Soon after the first 132 kV oil-filled cable had been installed in this country, the phenomena of gas generation was discovered. Hydrogen gas at a fairly high pressure was found in some cable oil ducts and in the oil tanks. An investigation into the behaviour of oils under stress showed that for any type of oil, at a given pressure, there is a critical electrical stress above which gas will be generated, due to ionic bombardment within any bubbles or voids enclosed by the oil. At the time, highly refined oils were used in cables, and it was decided to replace all the free oil with a strong solution of naphthalene in a less highly refined type; this remedy proved effective.

After next dealing with leak location and automatic alarms, and reviewing wartime experiences with oil-filled cables, Mr. Ashton spoke of improvements that had been introduced. Higher dielectric stresses were now permitted up to 90kV/cm in recent designs, the thinner dielectric wall consequently necessary effecting considerable economies in the cable and oil tanks. Outer protection has been simplified by the elimination of one lead sheath. These economies together have brought down the weight of lead in one design from 12·5 tons/1,000 yd to 4·25 tons/1,000 yd. Maximum conductor temperatures have been raised 10° to 85° C, and there have been various detailed improvements both to cables and accessories. Future developments were likely to be the use of oil-filled cables for higher voltages and the substitution of aluminium for lead as a sheathing material.

Transformers

In the North-Eastern Centre, meeting at Newcastle, high voltage gear was again the subject. Here the Chairman is Mr. E. C. Rippon, M.I.E.E., and he chose as the subject of his address, some of the problems associated with large power transformers operating on e.h.v. systems. System conditions were first discussed, and it was noted that by international agreement, any systems designed in the future for operation at 220kV or above will be operated with effectively earthed neutrals at every transformation point in the system; consequently the power frequency voltage to earth will not exceed 80% of line/line voltage, and with regard to power transformers, permits the use of graded insulation. Appropriate insulation levels, based on the results of the Tidd project were dealt with to this background.

With regard to the impulse testing of transformers, Mr. Rippon stated that experience had shown that with modern methods of fault detection, voltage and current records obtained during impulse tests formed a sound and reliable basis for the acceptance or rejection of the transformer tested. Passing on to consider windings, he said that they were invari-

ably a compromise between the requirements of thermal, mechanical and dielectric strength. Impulse test strength is probably the main yardstick. Disc coil windings, by the use of electrostatic shields can be designed for high impulse strengths, and a linear distribution throughout the windings obtained, on an impulse voltage to earth basis.

However, for very high outputs, shielded disc coil windings present very difficult thermal problems, for as the insulation level is increased the thermal rating is reduced. Moreover, other kinds of winding offer the chance of reducing the distance between h.v. and l.v. windings for a given impulse level and reactance, and so of saving in the weight of active materials for a given output.

An improvement in this last factor may be effected by replacing the usual cylindrical barriers of press board or paper, with a solid paper dielectric, so reducing the distance between windings. This has been done in Germany and Switzerland. In this country, multilayer concentric windings have been developed for the same effective purpose, and they offer advantages from the thermal viewpoint. Mechanical problems, do, however, arise in construction, but they can be overcome.

After discussing shell type transformers and their possibilities, Mr. Rippon went on to review trends in e.h.v. transformer design. In Switzerland, he said, core type construction, using disc coils with solid dielectric had been successfully developed for large single phase units. In Belgium, shell type units of the modern graded type had been built, and a 300kV 100MVA 3 phase double wound design could be transported by rail with only the bushings removed. French manufacturers had used a triple concentric disc coil construction for 220kV, and were understood to be experimenting with a multilayer design. Two of the main U.S. firms used shell type transformers, while one has commenced manufacture of a multi-layer concentric winding.

Education

On Tuesday, October 9, Mr. A. W. Hirst, M.SC. (Eng.), M.I.E.E., of the East Midland Centre, delivered his chairman's address.

Mr. Hirst, anticipated in his intention to discuss the M.K.S. system of units by the Institutions symposium on the subject, comfined himself to a few general remarks on this subject, prefacing them with some comments on the famous men who had given their names to electrical units.

Turning to his main subject, he recalled that it was in 1901 that Professor Giorgi in Italy, and, quite independently, Professor David Robertson in England pointed out that if the units of length, mass and time were taken as the metre, the kilogram and the second, and μ was assigned a value of 10^7, the system so formed would include all the practical units. This system was adopted officially by the I.E.C. in 1935, and though the war probably retarded its general adoption, it greatly stimulated its use in certain fields, notably ultra short wave work. In spite of its increasing use in text books, however, the Chairman did not think that its general adoption was likely amongst power engineers of this generation. One difficulty was that the lengths of magnetic circuits were seldom measured in metres, so that, e.g., "ampere-turn per metre" had little meaning for the designer.

Advantages of the M.K.S. system showed up most noticeably when the effects of electric and magnetic fields have to be considered simultaneously, for here the value of having the correct relative values of μ and $\varkappa$ were most apparent. The presence of π was sometimes felt to be a stumbling-block in certain expressions relating to rectilinear systems, and a rationalisation process had been advanced which would eliminate π from expressions relating to rectilinear systems at the expense of its appearance in others.

Gradual Progress

At the I.E.E. symposium already mentioned, there had been a considerable majority in favour of the immediate adoption of the rationalised M.K.S. system; it was doubtful, however, if the meeting presented a true cross section of the profession as a whole. Mr. Hirst thought that general adoption of the system would be very gradual. Progress would depend to a very considerable extent on the attitude of the physicist, not only because of the large area of common territory shared with the electrical engineer, but also because he was in so many cases responsible for the early training of the electrical engineer. Certainly, all new text books on electrical technology should deal adequately with the relationships between the c.g.s. and M.K.S. systems and with rationalisation, and all senior students should be taught these facts, but M.K.S. units should not be introduced at too early a stage. In any case, the aim should be to give the student the facility for working in any of the three systems, which he would require not only during the envisaged transitional period before M.K.S. units came into general use, but also to enable him to read the technical literature of earlier periods.

E.D.A. FILMS

LAST Thursday saw the preview of two new E.D.A. films: "Out of the Dark" and "Electric Water Heating." Although differing widely in character and intended for totally different types of audience, both films are noteworthy examples of their respective species.

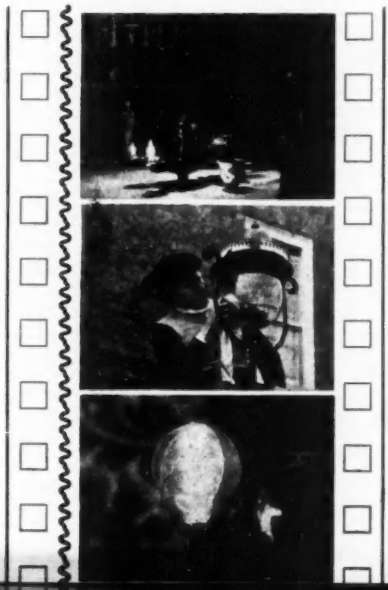
"Out of the Dark" is an educational film with a wider appeal than most, the producers having accomplished the difficult feat of a presentation which will be intelligible to youngsters without boring those of more mature years. It tells the story of how man has rendered himself relatively independent of daylight—from prehistoric man's first burning branches and stone lamps to the present development of artificial illumination—and it tells it well and without propaganda, the commentary being supplied by two experts in different spheres, DR. ARTHUR BRYANT, C.B.E., LL.D., on the historical aspect and PROF. E. N. DA C. ANDRADE, F.R.S., from the scientific standpoint.

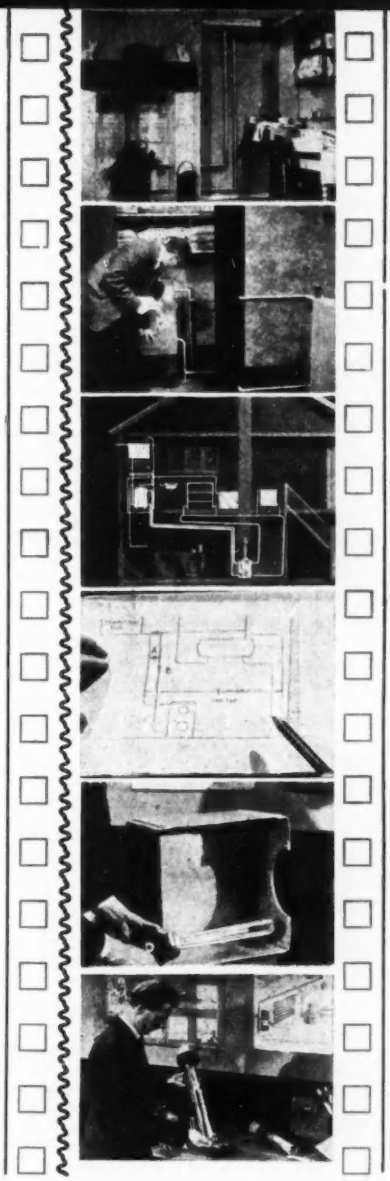
Produced by FRANK A. HOARE and directed by JOHN HURST of Merton Park Studios, the film gives 27 minutes of absorbing interest without a false note anywhere.

Water Heating

This marks a completely new departure for an E.D.A. film, since it is intended not for general educational purposes nor for popularising electricity but for serious practical technicians and will be seen with interest by contractors, Area Board staffs, plumbers and builders.

In 28 minutes, it could not possibly be hoped to cover the entire theory and practice of electric water heating, but this is happily not necessary, since the previous film "Domestic Hot Water," already reviewed in these pages, covers much of the theory in simplified form. In essence it confines itself to picking out several of the evergreen





snags in hot-water system conversion, in a manner sufficiently interesting to drive home the lesson. An engineer about to give a lecture on water heating is running through his notes with an older colleague who offers suggestions and criticism, illustrating his points with reminiscences from his own casebook. This film is remarkably free from the ghastly artificiality which frequently ruins this type of treatment, and we have seldom seen or heard any two men look and sound so completely and satisfyingly natural. MR. SEAFIELD HEAD who directed this picture has managed to give us an instructional film which is something more than an illustrated lecture.

overseas news

Rural Subsidy Defended

Defending the State Government's subsidy for power extensions to rural areas, the Premier of Tasmania, Mr. Cosgrave, stated that he is firmly of the opinion that the Government is justified in seeing that the service is extended to all people in outlying districts the same as in the more populous areas. He was commenting on the report of the Commonwealth Grants Commission, which had recommended the reduction from £1,100,000 to £876,000 in the grant. The Commission directed attention to the fact that the State Government is subsidising electricity extensions to rural areas, suggesting that the practice should cease and that the Hydro-Electric Commission of Tasmania should increase charges to cover these services. This suggestion Mr. Cosgrove combated when the Grants Commission took evidence in Hobart, he declared.

Clarence River Undertaking

An increase in unit sales of over 14% is reported by the Clarence River County Council, New South Wales, for the year to December 31 last. Output of the Nymboida hydro-electric station, at over 38 million units, was a record, due to the high river flow, and, in addition, nearly 18 million units were generated at the Lismore diesel station, where a 1,000 kW set was put into commission early in the year. Nearly 13 million units were also purchased from the Department of Railways. Although pushing on with construction of the Koolkhan steam station, the Council has decided to proceed with other hydro-electric development, and a full-time civil engineer has been appointed. The report shows that the number of retail consumers increased a further 1,183 to a total of 15,109, and the year's working resulted in a net surplus of £2,238.

A Long Line

A 200-mile long transmission line to run from the new Port Augusta power station to Adelaide is now under construction by the Electricity Trust of South Australia. When completed, this station will be farther away from its main distribution centre—Adelaide—than any other power station in Australia, it is claimed. Altogether, two 200-mile 132 kV lines and four main substations are being erected, at a cost of £2,700,000. It is hoped to supply Port Pirie and Port Augusta by this line from Osborne generating station some time next year until the Port Augusta station is operating in 1955. For this station, site work is still in progress. A complete coffer dam has been erected and driving of piles for the foundations has commenced.

Expansion

The International Bank for Reconstruction and Development has granted to Yugoslavia a loan of £10 million, which is expected to be made entirely in European currencies, as a particular point has been made of finding non-dollar sources for the supply of electrical and transport equipment, mining machinery, industrial plant and agricultural equipment. Among the major projects planned for Yugoslavia is the extension of the electric power grid.

Madras Progress

The Government of Madras has adopted the policy of giving top priority for rural electrification, the Minister of Public Works, Mr. M. Bhaktavatsalam, told a gathering of State electrical engineers recently. Madras stood first among the various states in the matter of rural electrification, he added, but there were still a large number of villages to be served. It was rather a matter of resources. For example, there were great possibilities of tapping bauxite mineral resources in the Salem district. But the Government was told that to exploit those bauxite resources alone, as much power as was generated in the whole State would be required.

Similarly, they could not be satisfied with hydro-electric projects only. They had to have more and more thermal stations for power generation, and the Government had been examining the possibilities. It was also to be able successfully to tap the valuable lignite resources in S. Arcot, which would enable the State to add to its power generation. Later, after remarking that the Government would shortly take over the business of distribution of electricity throughout the State, he paid tribute to the efficient manner in which the undertakings had been conducted.

Aswan Dam Report

The Egyptian Government has decided to dispense with the services of British consulting engineers working on the Aswan Dam hydro-electric project, it was reported last Thursday. This apparently refers to Messrs. Kennedy and Donkin, the principal consultants, and to Sir Murdoch MacDonald, a former Under-Secretary and adviser to the Egyptian Public Works Ministry, who has been actively associated with the scheme for many years. Mr. Geoffrey Kennedy and Mr. S. B. Donkin, partners in the London firm, have also been members of the Aswan Dam Hydro-Electric Power Commission since its formation in 1945, and Mr. Kennedy was in Cairo earlier this month in connection with the scheme. But at the time of going to press we understood from Kennedy and

Donkin that no official information of any such decision had been received. Most of the contracts for the project have already been placed, and the preliminary site work completed. Tenders for the main civil engineering side were opened recently, although no decision has yet been announced. So far, the only British contractors are A. Reyrolle and Co. Ltd., who have obtained a £250,000 order for switchgear. Target date for completion of the scheme has been put at 1955, and for the ancillary fertiliser factory and iron and steel works, 1957.

Coal Needed

Although it was over four months ago that we reported the serious coal situation in South Africa, our latest news shows that there has been no considerable improvement. Up to a few days ago the reserves at Table Bay power station at Cape Town was 1,578 tons and at Salt River station, 1,014 tons. But as daily aggregate consumption is about 2,000 tons, the Electricity Department is anxious to get a reserve of at least 15,000 tons. The Electricity Supply Commission of South Africa last week held an enquiry into coal shortages in the Union. Among the evidence submitted by the City Council was a 22-page record of correspondence dating back to 1936.

More Taxation

A tax of 30% *ad valorem* in addition to the existing Customs duty, on refrigerators, immersion heaters, electric cookers and fans, has been imposed by a decree of the Persian Government last week. The tax will be levied under a law of the late Reza Shah, establishing a monopoly of commerce, which has long since lapsed but which has never been repealed.

N.Z. Power Position

"A dismal and gloomy story" was how Mr. C. J. Lovegrove (president of the Power Boards and Supply Authorities' Association) summed up the review of New Zealand hydro-electric projects the general manager of the State Hydro-Electric Department (Mr. A. E. Davenport) gave to the Power Boards' officers' conference of the Electric Power Boards and Supply Authorities' Association recently. Power authorities had hoped to see some restrictions relaxed early next year. But Mr. Davenport told them it could not be expected until October and would more probably be December. Administration difficulties had been serious in the past for supply officers. But they were as nothing to the problems officers would face in the future. Rationing difficulties were going to endure for many years. In plant construction the department had had a constant struggle to keep the schedule. The Waitaki and Roxburgh Gorge power projects in the South Island were to be constructed under contract. Because of the manpower shortages neither job was up to schedule. Under the present conditions they could not hope to meet the target dates of 1954 and 1956. But suitable coalfields for steam plants in the North Island were still being investigated. The South Island picture was not so gloomy for the Government did intend investigating a steam plant there.

Too Cautious?

Grounds for fearing that the economic advisers of the New Zealand Government were being unduly influenced by the capital cost of some of the national projects—particularly electrical undertakings, were referred to by Mr. C. J. Lovegrove in his presidential address to the Electric Power Boards and Supply Authorities Association. The electrical industry was fast approaching the day when it must be freed from political control, he went on, emphasising that divided control of the works programme of the electricity undertaking must cease. If the control of generation was to remain a State monopoly it should not have to compete for priority with national projects under the control of its own contractors—the Ministry of Works, he added. Later, it was decided to change the name of the organisation to the Electric Supply Authorities' Association.

Steam Plants

Investigations for an "ideal coalfield," which could be fully mechanised to provide fuel for a steam power station, were being carried out by the Department of Scientific Affairs, the Minister in charge of the New Zealand State Hydro-Electric Department, Mr. Goosman, said at a conference recently. But there were shortages of everything, he stressed, and dealt especially with the effects of the coal shortage. Although New Zealand had plenty of coal in the ground, production was still very short. Sea freight was costing from £8 to £10 a ton, and the present shipment from India cost £12 a ton landed in New Zealand. On the last coal from the U.S., freight alone was £9 a ton and the landed cost, £12 10s. a ton.

In this connection, the New Zealand Government is urgently recommended to install fuel-burning plant, as in Australia, in the way of packaged power plants and floating power plants, said Mr. M. I. Robinson, engineer-manager of the Hutt Valley Electric Power Board, in presenting the North Island power supply report to the Supply Authorities' Association conference. "It is a queer quirk of fate that we have been recommending steam plant for years, the South Island has been opposing it, and now they are going to get it and we are not," he commented.

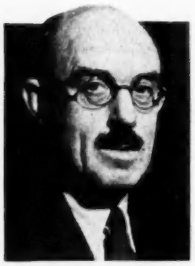
Tariff for Jamaica

Under amendments to the Jamaican Customs Tariff put into effect this month, batteries, accumulators, lamp bulbs, electric heating apparatus (including small domestic appliances,) are chargeable at 20% Preferential tariff and 25% by the general tariff. Electric refrigerators, electro-medical apparatus, illuminating glassware, portable tools, radio and television sets, air conditioning machines, are chargeable at 15% and 20% respectively. The tariffs for insulated cables and wire are 10% and 15% respectively, but generators, motors and rotary convertors are admissible without duty under the Preferential tariff.

PERSONALITIES

IN THE INDUSTRY

Just appointed managing director of E.M.I. Research Laboratories Ltd. is **Mr. G. E. Condliffe,** O.B.E., B.SC., M.I.E.E., who has for some time been managing director of Emitron Television Ltd. He was originally with the Research Dept. of the War Office in the Royal Arsenal, and, joining the research laboratories of the Gramophone Co. Ltd. in 1929, was intimately connected with the evolution of the Emitron television system by Electric and Musical Industries Ltd., and with the design and production of television transmitting equipment for the B.B.C. He was awarded the O.B.E. for his work on radar projects for the Ministries during the war, and since then he has been concerned with a variety of projects for television transmission both in this country and abroad.



Mr. G. E. Condliffe

Mr. C. J. Lovegrove, of Auckland, has been re-elected president of the newly styled Electric Supply Authorities Association, of New Zealand.

Another who retired recently is **Mr. G. F. Shotter,** M.I.E.E., meter testing laboratories superintendent of the Northmet sub-area of the Eastern Electricity Board, who completed 45 years service in the Industry. He has, of course, been an outstanding figure in the field of instrument technology, and a prolific inventor with nearly 100 patents including many types of electrical and mechanical instruments to his credit. Incubators and soil heating methods have also been the subjects for his investigation or patents. Mr. Shotter was a founder member and the first president of the former Meter Engineers' Technical Association. He was chairman of the I.E.E. Measurement Section in 1936 and has been awarded the John Hopkinson, the Kelvin and other premiums. Many will also remember his amusing amateur dramatic sketches, with the late Mr. E. H. Miller, at the Measurement Section dinners. His many friends will be glad to hear that he does not propose to give up technical pursuits, but rather to carry on with consulting activities, together with a certain amount of committee work.

Returning to Canada by air today (Thursday) is **Mr. G. R. B. Morgan,** A.M.I.E.E., who is responsible for administration of the steam power plant of the Hydro-Electric Power Commission of Ontario. One purpose of his visit has been to recruit certain staff for the Commission's stations.

The Kernot memorial medal for 1951 has been awarded to **Mr. C. H. Kernot,** M.I.E.Aust., formerly chief engineer to the State Electricity Commission of Victoria. This award, for distinguished engineering achievement in Australia, was founded in 1925. Mr. Kernot is a nephew of Professor Kernot, in whose honour the award was instituted. He retired at the beginning of last year.

Guest, Keen and Baldwin's Iron and Steel Co. Ltd., announce that **Mr. H. W. A. Waring,** for four years the company's secretary, is leaving to become director of the power and steel division of the Secretariat of the United Nations Economic Commission for Europe in Geneva.

Mr. M. J. C. Taite has resigned from the board of the National Electric Construction Co.

Mr. H. I. Matthey has been elected a director of the Ship Carbon Co. of Gt. Britain Ltd.

Nettle Accessories Ltd., have recently appointed **Mr. W. A. Cowie** and **Mr. A. H. Armitage** as their representatives in the North West and North East respectively. Mr. Cowie will cover North Wales, Lancashire, Westmorland and Cumberland, whilst Mr. Armitage will cover Yorkshire, County Durham and Northumberland.

Mr. E. B. M. Grubb, A.M.A.S.E.E., has assumed the position of general manager of D. H. Bonnella and Son Ltd., upon relinquishing his appointment as sales director of the London Electrical Company (Blackfriars) Ltd.

Our accompanying photograph was taken at the recent Branch Managers' Conference held by the Simplex Electric Co. Ltd. It shows **Mr. E. G. Plucknett,** centre, with **Mr. A. G. Jones,** left, directors and joint general managers of the company, together with **Mr. J. D. Johnson,** manager of the Simplex Division on the right.

At the Simplex Branch Managers' Conference

Sir Claude Gibb (right) presents a gold watch

Nearly 500 employees of A. Reyrolle & Co. Ltd., with 25 or more year's service with the Company were entertained to dinner by the directors recently. The guests were greeted by the chairman, **Sir Claude D. Gibb,** C.B.E., D.SC., F.R.S., who afterwards presented gold wristlet watches to 38 members of the company who had completed over 40 years service. **Mr. L. Mellor,** M.B.E., J.P., one of the recipients, responded for the guests. A very merry evening was suitably rounded off with entertainment.

Mr. E. J. Batchelor has been appointed managing director of Henry Meadows, Ltd., of which he has been a director and general manager. He was until recently managing director of Brush Coachwork, Ltd.

Major S. J. J. Vaughton, M.C., T.D., has recently been appointed assistant managing director of Higgs Motors, Ltd. He was educated at King Edward's School, Birmingham, and during 26 years' service with Higgs Motors, Ltd., has held positions as sales engineer, sales manager and director.

Associated with E.M.I. since 1923, **Mr. P. P. Vernon** has been appointed managing director of E.M.I. Suppliers Ltd., and will be responsible for all the purchasing activities of the group. He started as a progress clerk in the Purchasing Department of the Gramophone Co. At the outbreak of war he became assistant purchasing controller, being responsible for the purchasing and maintenance of supplies needed for the special armament work on which the E.M.I. factories were engaged. He became a director of E.M.I. Suppliers, Ltd., on its formation in 1946.

Mr. P. P. Vernon

Mr. C. Lacy-Hulbert has resigned his position as technical director of Simplex Electric Co., Ltd., with effect from September 30. Except for a period of six years as works director of Tubes, Ltd., he has been associated with the Electrical Division of Tube Investments, Ltd., since 1930. He has now taken up his new appointment as managing director of Craig and Derricott, Ltd.

OBITUARY

Mr. H. Coope, M.I.E.E., for many years, district manager at Cardiff for the Metropolitan-Vickers Electrical Co. Ltd., died on October 20, aged 64.

The death occurred on October 12, of **Mr. W. B. Parker,** F.I.C., aged 77, who retired from the British Thomson-Houston Company in 1946, after 44 years service. He was the Company's chief chemist and metallurgist from 1902 until 1943, when he was appointed consultant chemist and metallurgist.

The death occurred on October 3 of **Mr. T. C. Irving,** B.SC., A.M.I.E.E., who was until very recently the representative in Spain and Portugal of the Metropolitan Vickers Electrical Export Co. Ltd. But for his untimely death Mr. Irving would have been destined to play an important part in the Company's South American activities, and it was during a preliminary visit to Brazil that his health broke down. He returned to this country and died suddenly after a serious operation. Mr. Irving received his technical education at Edinburgh University, and joined M-V as a college apprentice in 1925. After a short period in Plant Sales Department he joined the Export Company, and went to Spain at the end of 1927, spending three years in Madrid and then moving to Bilbao. He became the Company's representative in Spain and Portugal in 1937. In addition to his other attainments as pianist and artist, his many friends will recall his prowess at golf—he twice won the Portuguese Open Amateur championship.

Mr. T. C. Irving

Mr. C. P. Newman, chairman of Newman, Hender and Co. Ltd., and of Wright, Bindley and Gell Ltd., died last week aged 75. He was also a director of S. Smith and Sons (Cheltenham) Ltd., and a member of the council of the British Engineers' Association, and of the grand council of the F.B.I.

Mr. R. W. Neale, a former chairman of James Neale and Sons Ltd., Birmingham, died on October 19, aged 83.

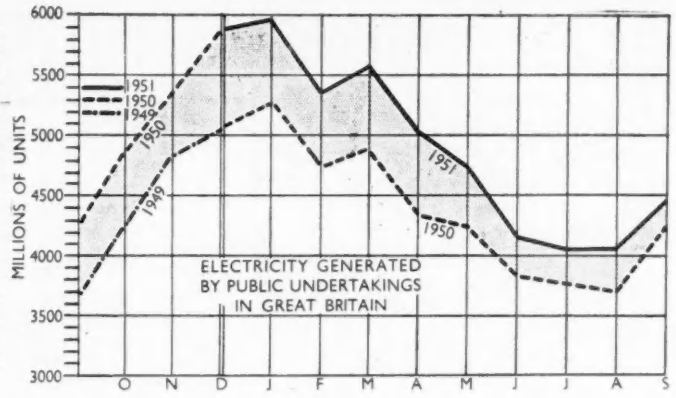
Mr. A. H. Gledhill, J.P., chairman and managing director of Gledhill-Brook Time Recorders, Ltd. died on October 20, aged 77.

UNITS GENERATED

4,462 million units was the total generated during September in stations under the control of the B.E.A. and the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 4,246 million, so there has been an increase of 5·1%.

Of the total, 4,325 million units was generated in steam stations and 126 million in hydro-electric.

Energy sent out during the month was 4,203 million, 94·2% of that generated. This gives a total for the year up to September 31, of 40,924 million units, an increase of 11·6% on the corresponding period of 1950.



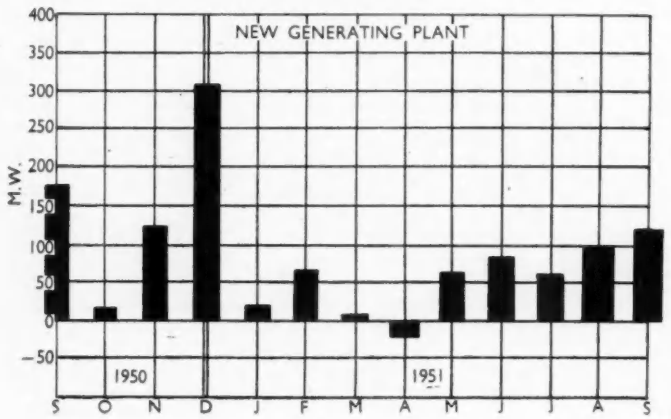
POWER SUPPLY IN SEPTEMBER

LARGEST set noted in the September installation reports is a 60 MW turbo-alternator at Fulham (London Division). This brings the installed capacity of this station up to 360·1 MW and completes extensions as planned for up to 1956. Also in the list for September is the first set to come into operation at Westwood, a station near Wigan in the North Western Division. It is a 30 MW B.T.H. machine, working with the standard steam conditions of 600 lb/sq in., 850° F at turbine stop valve. Finally, amongst the stations with additional machines is Peterborough (Eastern Division) with a 20 MW English Electric set that leaves only one boiler to come for completion of the station extensions.

Work on Croydon B (South Eastern Division) has continued with the commissioning of a third Simon Carves 320 klb/hr. boiler, leaving two 52·5 MW sets and five boilers still to come, and the Midlands Division concludes the list with a second 230 klb/hr International Combustion Ltd. boiler at the new Nechells B (Birmingham) station.

Units

Figures for units sent out show the lowest percentage increase on a yearly basis since March, 1950, with a total 4·7% above that for September, 1950. There has been a steady fall in this increase since April of this year, when 16% was recorded. The increase for the first nine months of this year is 11·6%, on the same period of 1950, and that in turn was 11·1% on January to September of 1949. The figure for the 1949 increase referred to a 1948 basis was only 4·8%, and so the effective average rate of increase stands at 9·1%.



GENERATING PLANT

At the end of September, 1951, the installed capacity of the B.E.A. was 14,987 MW, showing an increase of 113 MW during the month. During the same period the North of Scotland total went up by 6 MW to 593 MW. The month's commissionings bring the overall increase during the past twelve months to 944 MW, or 6·4% of the September, 1950, total.

The total installed capacity used for the purpose of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides, and are suitable for service.

The Motor Show

Electricity's Contribution to Safe and Comfortable Travel

THE Motor Show, being held this year at Earls Court from October 17 to 27, is justifiably regarded as one of the most important exhibitions of the year. To the electrical engineer, however, the main interest (apart from personal inclinations) lies mainly in the maze of accessory stands on the first floor. The cars themselves are, of course, well worth while examining as examples of British and foreign engineering techniques, but with present-day prices and purchase tax, allied to the long delivery dates quoted—many in the neighbourhood of five years—the majority of would-be purchasers who go to the show must inevitably be disappointed.

Upstairs, however, can be seen in profusion all those items which go to making up a modern car, and which contribute so much towards keeping it running well and efficiently during its life—a most important function nowadays.

Batteries

Modern tendencies all lean towards placing greater responsibility on the battery, and even with modern techniques the life of the car battery is limited, although considerably greater than a few years ago. Chloride Batteries Ltd., for instance, are showing their well-known "Double-Life" batteries, which carry with them a guarantee of two years' life or free replacement, while Peto and Radford have the "Dual-Life" Dagenite range, which have negative plates enclosed in envelopes of a tough microporous plastic material which entirely obviates the risk of internal short-circuits. Both batteries and chargers are being shown by Oldham and Son Ltd., who include a full range of "Heavy Duty" batteries for every make of motor car. The newest charger is a 30 V unit having a range from one to four 6 V batteries with a variable charging rate of 3 to a maximum of 8 amps at any one of the four positions. The unit is arranged for use on a bench, and is suitable for 210/230/250 V at 40/60 c/s. Batteries for both car and marine purposes are shown by Young Accumulators.

Crypton's, while not showing batteries, have several chargers on view. Of these, probably the most interesting is the ATC 1260 Fast Battery Charger Analyser, which can charge 6 V batteries at 100 amps and 12 V batteries at 80 amps. The analyser section allows the battery to be checked to show its capability of accepting these high charging rates, and a thermostatically controlled trip circuit shuts down the charger, should the temperature of the electrolyte rise to 120° F.

Ediswan have quite a range of equipment on view, including starter batteries in the "Crown," "Standard" and "Extra-Life" ranges, as well as battery chargers, TV interference suppressors, battery repair equipment and wires and cables. Chargers only of all sizes are on view at the stand of F. C. Heayberd and Co., who also have a range of low-output transformers for operating inspection lamps and small tools.

Davenset battery chargers also for all duties and Davenset battery accessories are available from Partridge Wilson and Co. Ltd.

In addition, there are the special chargers made by the Westinghouse Brake and Signal Co. with outputs ranging from 72 to 2,400 W.

The stand of Chloride Batteries Ltd. exhorts one to "throw away the starting handle"

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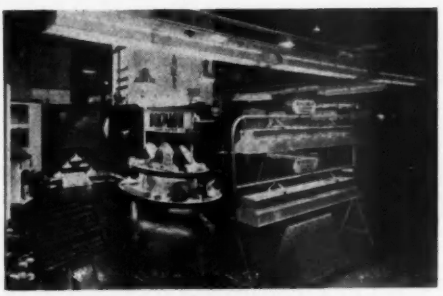


Above are two views of the "X-Ray" Minx. The electrical equipment uses 38 Atlas fluorescent lamps and was devised by Pearce Signs Ltd. Below are views of B.T.H. and Benjamin's stands

Shop Equipment

The workshop equipment of electrical interest is, of course, principally confined to small machine tools. Desoutter Brothers are showing many of their latest power tools, including two-speed portable heavy-duty electric drills of $\frac{5}{8}$ in. and $\frac{1}{2}$ in. capacity. These are powered with 0·35 h.p. motors. Pneumatic tools, including miniature screwdrivers, are also on view. Black and Decker have placed emphasis on valve-grinding equipment, although they too are showing portable electric drills, sanders, grinders, saws and screwdrivers. Similar exhibits can be seen at the stand of Wolf Electric Tools. A firm in the same line, although not so well known on the home market, is Duplex Electric Tools Ltd.

Test and fault diagnosing equipment is provided by the Armature Manufacturing Co., whose range of Octopus test benches and other items is well known, and also by Crypton's, who have a complete engine diagnosis bay and the B.100 motor analyser on show. Other electrical test sets by this company are the Crypton Distributor Analyser, the Portatest Electrical Test Set and the Motoriser Portable Fault Finder. Runbaken Electrical Products are also showing auto-electric test equipment.

The majority of British cars are fitted with electrical equipment made by Joseph Lucas Ltd., but many other firms also make electrical items. B.T.H., for example, have several magnetos for 2-, 4-, 6- or 8-cylinder engines and also make Mazda car bulbs in all sizes. Philips Electrical Ltd. make special and general use car bulbs and are showing car radio and battery chargers in addition. Runbaken have ignition coils and accessories, and Scintilla Ltd. make a range of magnetos to replace existing coil ignition equipments. This firm also provides starters, dynamos, switchboards, direction indicators, etc.

Lighting equipment for factories, garages, service stations, offices, showrooms, car parks and outside storage areas are being exhibited by the Benjamin Electric Ltd., who have made a particular feature of their "Flurolier" reflectors and fittings for fluorescent tubular lighting.

Engineers visiting the show, however, should not miss the marine section in which some fine examples of workmanship may be seen. Other items of outstanding interest are the "X-ray Minx" on the Hillman stand, the beautiful examples of hand-built coachwork on Hoopers, Park Ward, Mulliners, and Thrupp and Maberly's stands, the power-operated hood and windows of the Lanchester Fourteen drophead coupé and the numerous sectioned working engine models.

The BUYER'S *Column*

New Simplex Switchfuses

LATEST addition to the range of switchgear available from SIMPLEX ELECTRIC CO. LTD., Broadwell, Oldbury, Birmingham, is the 3481/3681 switchfuse for 250 V 15-amp service. It embodies the principal features to be found in the well-known pattern, Cat. No. 3581, together with many improvements suggested by market needs.

The 3481/3681 has clean modern lines

Constructed in pressed steel, the new switchfuse has clean attractive modern lines free from corners and crevices. Its double combination switchfuse base can be arranged for switched or unswitched single-pole and neutral. It can be fitted with rewirable type carriers or a carrier to take cartridge fuses to B.S. 1361 (15 amps).

Full interlock is provided with specially designed die-case handle, whilst standard entries of 1 in. to ¾ in. clearance hole top and bottom are fitted with diaphragm rubber grommets providing in the case of direct cable entry a dust-excluding seal. Standard finish of the 3481/3681 pattern is Silvex 11, sprayed on after the metal surface has been Bonderised.

Prestcold's New L.71

WITH its steel cabinet finished in white high bake synthetic enamel and a full-length vitreous enamel liner enclosing 3-in. fibreglass insulation throughout, together with ten-point temperature control, the new Prestcold Model L71 just marketed by the PRESSED STEEL CO. LTD., Cowley, Oxford, presents full-length high capacity storage with trouble-free service at low running cost.

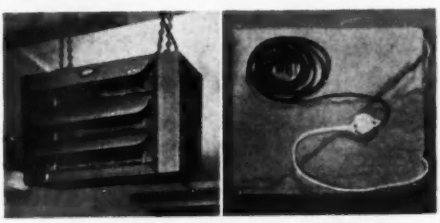
Full length storage is afforded with the L.71

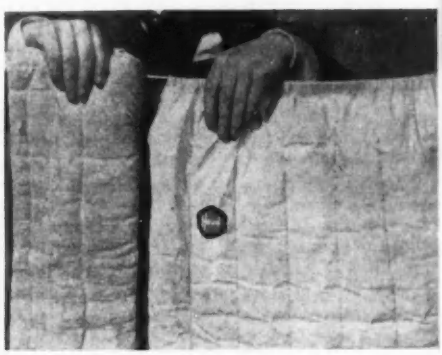
New features include 7 cu ft capacity in small floor space, trigger-type door latch, a large frozen food locker (26 lb capacity), automatic interior lighting, automatic interior light, two new design ice trays, adjustable feet for levelling cabinet, fold-down top shelf with adjustable middle shelf and glass-topped transparent "Crispator."

The new range of Hurseal Products mentioned last week and on these pages

Left: The Room Thermometer

Bottom L-R: the unit heater, the bed sheet and the lagging





Fitted with the Prestcold "Presmetic" power unit, the L.71 is available for a.c. 100/125 V or 200/250 V 50 c/s supplies, or for 40-60 c/s frequencies. It is guaranteed for five years.

Hurseal Insulation Material

FURTHER addition to the new range of goods marketed by HURSEAL LTD., 229-231 Regent St., London W.1, is the Hurseal insulation material, designed to prevent much of the heat wastage and consequent fuel wastage which is still prevalent.

The company has decided to concentrate on the domestic market for the time being, and therefore have turned their attention to the provision of cylinder jackets, pipe covering materials and felted mineral wool.

The cylinder jackets will comprise an American Cloth front and a number of strips known as Scrim Strips. The lengths and widths are standardised to three sizes as under: A.C. 36, size 21 in. x 36 in., price £1 15s.; A.C. 45, 21 in. x 45 in., price £2 5s.; A.C. 57, 21 in. x 57 in., price £2 15s.; SS.36, 7 in. x 36 in., at 6s.; SS.45, 7 in. x 45 in. at 7s. 6d., and SS.57, 7 in. x 57 in., at 9s.

Various sizes of cylinder can be protected by using a combination of the various pieces.

For covering pipes it is recommended that the standard scrim strips be laced together and used without any difficulty.

The Hurseal felted mineral wool is supplied in bulk and delivered in standard sacks of ½ cwt. One ton of mineral wool will cover an area of 2,500 sq ft, 1 in. thick. Prices per ton are: Quantities less than 1 ton, £22 10s. per ton; 1 ton costs £15; over 1 ton but less than 2 tons, the price is £20 10s. a ton, whilst 2 tons costs £20. Carriage extra on quantities of one ton or less. Price for quantities over one ton includes delivery.

Price Increases

AS from October 1, the price of certain of the lighting fittings marketed by LINOLITE LTD., 158 Bishopsgate, London E.C.2, have been increased.

A new price list is available from the firm incorporating the changes in price, which represent an average advance of approximately 5% over all their total output.

TRADE PUBLICATIONS

WATER HEATERS.—A leaflet dealing with the prices of Creda storage water heaters together with amendments up to September 12, is available from Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham.

METAL TREATING.—The "Bonderizer" monthly news sheet issued by the Pyrene Co. Ltd., Great West Road, Brentford, Middx. this month features articles on Climax tools and GB-Kalee film equipment.

INDUSTRIAL LIFT TRUCKS.—An interesting coloured booklet issued by Ransomes, Sims and Jeffries Ltd., Orwell Works, Ipswich, England, deals with the Forklift 40 electric lifting truck.

SWITCHGEAR.—"Switchgear News" No. 10, one of the monthly bulletins issued by Cooke and Ferguson Ltd., Openshaw, Manchester, 11, deals with Type OF.1 outdoor oil circuit-breaker.

DIESEL ELECTRIC LOCOMOTIVES.—English Electric Co. Ltd., Queen's House, Kingsway, W.C.2, have issued an interesting addition, No. 103, to the Diesel Electric traction series. It deals with Britain's first main line diesel-electric locomotives.

POWER UNITS.—Some of the Diesel alternator units embodying Sentinel Diesel engines are described in new leaflets issued by Sentinel (Shrewsbury) Ltd., Shrewsbury, Shropshire.

LIGHTING FITTINGS.—An illustrated catalogue showing the complete "Utilair" range of fluorescent lighting fittings and equipment made by Utilities (London), Ltd., 435-437 Brixton Road, London, S.W.9, is available to dealers in the trade.

DUCT-MAKING.—An interesting brochure issued by Ductube Co., Ltd., Regent House, 235-241 Regent Street, London, W.1, surveys the advantages of using "Ductube" in the fabrication of cable ducts in concrete.

GENERATING PLANT.—"Generate your own electricity now," is the exhortation used as title to a new A. C. Morrison (Engineers), Ltd. leaflet. The address of the company is Rectory Place, Loughborough, Leics.

CABLES.—"Ediswan" cables for farm wiring are listed in a booklet issued by Edison-Swan Electric Co., Ltd., 155 Charing Cross Road, London, W.C.2.

EMERGENCY LIGHTING.—A brochure just issued by Chloride Batteries, Ltd., Exide Works, Clifton Junction, nr. Manchester, gives full details of the "Keepalite" automatic emergency lighting apparatus which offers complete protection against mains power supply interruptions.

BOILER WATER TREATMENT.—Albright and Wilson, Ltd., 49 Park Lane, London W.1, are specialists in the supply of chemicals to prevent trouble with scale, hardening and deposits in boiler installations. Threshold treatment with "Calgon" the glassy sodium metaphosphate supplied by the firm is discussed in a new booklet.

WAR SURPLUS EQUIPMENT.—Altham Radio Co., Brazennose Street, Manchester, have issued lists giving details of Government war surplus equipment to clear.

COOKERS.—The Creda "Comet" is featured in an attractive folder issued by The Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham.

DISTRIBUTION GEAR.—Busbar and sealing chambers, glands, connection boxes and unit panels are featured in a leaflet issued by Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

THE DAIRY SHOW AT OLYMPIA

THE theme of this year's Dairy Show is, from our point of view, that set by the display of the Electrical Development Association.

This display is designed as an inquiry and information bureau and incorporates as part of its architecture man-size models of the Festival Farm buildings at Castlereagh, N. Ireland. The theme of the display is: "Electricity ran the Festival Farm . . . the most up-to-date farm in the World." The Dutch Barn in the model houses film strip projectors each of which displays to the dairyman visitor some of the many advantages of electricity in farming.

Milking equipment electrically operated is well to the fore, whilst milk cooling and pasteurising and bottling equipment is we believe entirely the province of electric power; here such names as G.E.C., Prestcold, International Refrigeration, Frigidaire, Prurac Equipment are prominent.

Electric vehicles for milk delivery are ideal in view of their range and economy, so many manufacturers have taken advantage of this opportunity to display vehicles. Amongst names are Austin, Crompton Parkinson, Hindle Smart, Brush Coachwork, Sydney Holes, Lancaster Electric Vehicles, T. H. Lewis, Diamond Motors and Smiths Electric Vehicles. Batteries for these vehicles and other purposes are shown by Tudor Accumulators, D.P. Batteries and others.

Amongst new inventions are a floating dairy thermometer shown by the British Rototherm Co. and the Rototherm silage and slack thermometer. Smiths Electric Vehicles' new mobile self-service shop and J. W. Wooley's "Lectrolid" electric potato steamer are also in this class.

Curfew Appliances' new electric food steamer, the Laybat Infra Red dull emitter conversion unit by Clarbat Ltd., George H. Elt's warm floor battery brooder, Sutherland Thomson and Co.'s electrically heated Gerber centrifuge and their electro-magnetic colony counter. An Doc Ltd.'s all-purpose unit for supplying compressed air, vacuum, electric light and freshwater supply, and the "Atom Block" steam generator and hot water boiler by Perkins Clean Milk Equipment.

New B.N.E. Immersion Heaters

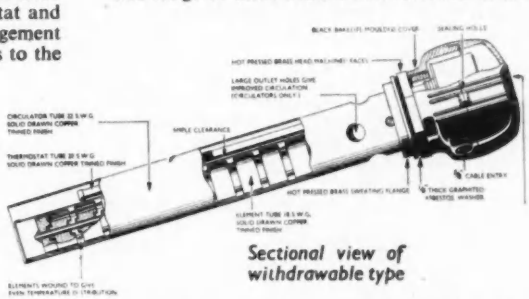
THROUGH the courtesy of British National Electrics Ltd., Newarthill, Motherwell, Scotland, we have been afforded an opportunity to inspect one of the first production models of their new type immersion heater.

Most noticeable feature of the new unit is the pleasing appearance of the moulded plastic head which encloses the terminals and thermostat and is provided with cable entry hole and arrangement for sealing, preventing unauthorised access to the thermostat setting.

The general construction of the wound element withdrawable type is shown in the accompanying sectional drawing, which shows the method of supporting the elements by refractories threaded on a central rod, thus allowing expansion and preventing sagging. The unit is also made with non-withdrawable elements of the embedded type. The pattern submitted to us was withdrawable, and it was found that element removal was easy and speedy. Another point which impressed us favourably was the ease of access to the terminals and the ample space provided for connectors.

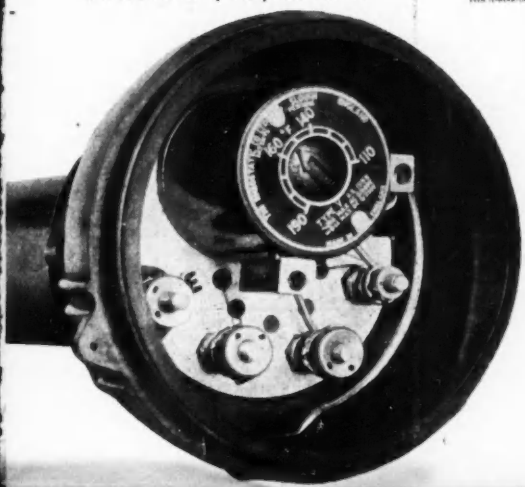
The range of these heaters was reviewed in the immersion heater market review in our issue for Sept. 13. Prices range from £5 6s. for an 11-in. non-withdrawable pattern, 2 kW rating to £7 14s. for a 3 kW, 30-in. withdrawable type. Circulators are approximately 10s. dearer than ordinary heaters. These heaters comply strictly with B.S. 1556, and prices are based on the a.c. models. For d.c. there is an extra charge of 35s. for a mercury thermostat.

Horizontal immersion heaters and horizontal circulators which do not comply with B.S. 1556 in that they use a mechanical type oval fixing flange are also listed in the new publication H.D. 23, which has just been issued giving full details of the entire range.

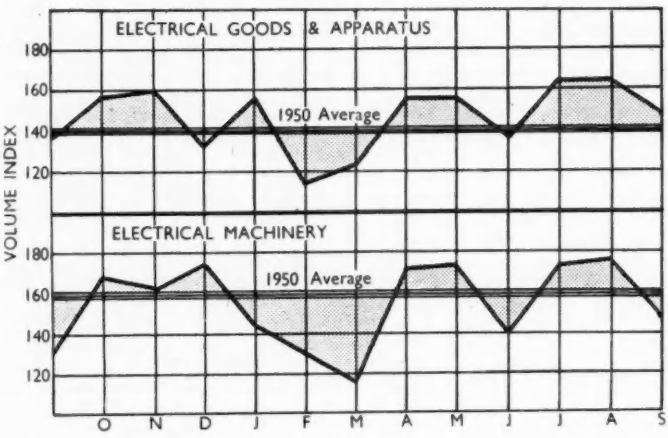

BLACK BAKELITE MOULDED COVER
SEALING HOLE
HOT PRESSED BRASS HEAD
LARGE OUTLET HOLES GIVE IMPROVED CIRCULATION (CIRCULATOR ONLY)
CIRCULATOR TUBE 22 S.W.G. SOLID DRAWN COPPER TINNED FINISH
THERMOSTAT TUBE 22 S.W.G. SOLID DRAWN COPPER TINNED FINISH
CABLE ENTRY
HOT PRESSED BRASS SWEATING FLANGE
THICK GRAPHITED ASBESTOS WASHER
ELEMENT TUBE 18 S.W.G. SOLID DRAWN COPPER TINNED FINISH
ELEMENTS WOUND TO GIVE EVEN TEMPERATURE DISTRIBUTION

Sectional view of withdrawable type

Below, inside of the plastic head



EXPORTS AND IMPORTS



EXPORT VOLUME INDEX

September brought a sharp drop in export figures, after two months of high-level achievement. In the case of electrical goods and machinery, the fall was one of 15 points down to an E.T. index figure of 146% of the average 1947 volume. This is calculated after allowing for price changes since that year.

In the case of electrical machinery, the fall was sharper still. The total value of £3,991,016 was more than £600,000 below the August peak and its equivalent on a 1947 basis, which is 148%, is below the 1950 average for this class of export.

ALONG with a general decrease in export trade, electrical goods sent abroad last month amounted to £1,243,181 less than the record August value. Again, the reduction was fairly evenly spread over most of the items listed below. An exception were electrically operated portable mechanical appliances, including vacuum cleaners. In addition to our table, 30,130 complete electrically operated washing machines, valued at £722,204 were exported during last month, compared with 23,310 amounting to £548,694 sent abroad in August. But portable electric tools at £84,730 in value dropped by nearly £50,000, compared with the total for the previous month.

Description	Exports Value Month of September			Imports Value Month of September		
	1949 £	1950 £	1951 £	1949 £	1950 £	1951 £
Telegraph and Telephone Wires and Cables—						
Submarine	98,598	44,583	—			
Other	904,271	462,944	336,842	6,483	10,473	42,779
Rubber Insulated	333,726	354,677	556,557			
Insulated, other than Rubber	972,670	685,984	885,075			
Wireless Apparatus, including Valves	1,119,871	1,732,476	1,853,471	91,660	243,277	284,731
Telephone and Telegraph Apparatus	1,716,302	1,229,098	1,324,295	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament lamp bulbs	82,216	99,309	150,969	6,788	21,079	11,392
Other Descriptions	367,176	262,496	397,652	5,464	25,103	57,346
Batteries (primary)	91,073	140,396	241,240	—	—	—
Accumulators, Portable	236,163	251,266	464,469	—	—	—
,, Stationary	45,686	61,847	70,421	—	—	—
,, Parts and Accessories	61,229	55,753	93,639	—	—	—
Electric Cooking and Heating Appliances	169,593	244,958	449,523	—	—	—
Ammeters, Voltmeters, etc., and Parts	98,541	90,776	98,558	18,507	40,672	43,558
House Service Meters	136,557	102,569	134,843			
All Other Instruments	108,917	121,865	106,105			
Electro-Medical Apparatus	29,811	44,003	46,693	—	—	—
X-ray Apparatus, etc.	112,424	84,201	127,270	27,682	68,827	20,419
Insulating Materials	129,602	125,976	202,080	—	—	—
All Other Articles	402,631	465,355	514,829	106,016	68,827	125,876
Total of Group	7,217,057	6,660,606	8,064,531	262,600	425,275	586,101
Electrical Machinery:—						
Generating Sets (Diesel)*—Not exceeding 200kW	1,115,382	323,907	342,182	34,196	19,301	14,538
,, ,, ,, Exceeding 200kW		130,401	81,849			
Other Generating Sets		331,370	423,790			
Generators minus Prime Movers, and Parts†		115,077	429,992			
Motors	706,967	613,680	779,106	12,393	29,142	35,595
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,520,509	1,498,939	1,942,097	16,549	11,264	34,657
Fans, Electrically and Power Driven	145,196	139,244	159,080	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	208,511	298,304	696,902	—	—	—
Total Appliances and Machinery	10,913,622	10,111,528	12,919,529	315,738	484,982	670,891

* 1950 figures include generators minus prime movers. † 1950 figures for parts of generators only.

THE WEEK

COMMERCE *in news* INDUSTRY

Lighting Restrictions Eased

FOLLOWING meetings between the Minister of Fuel and Power and organisations affected by the restrictions imposed on advertisement lighting, it has been decided to relax certain restrictions this winter. Accordingly the Minister has made a licence permitting a limited scale of lighting in shop windows, hotels and places of entertainment as from last Monday. The effect of the licence is that during the period when advertisement lighting is not permitted (that is, on weekdays from 7 a.m. to 7 p.m. from now until April 4), between sunset and when the premises close, some lighting may be used to show that the shop is open, to illuminate windows, menus and programmes of entertainment.

Fittings employed must not exceed in power, in the aggregate, in the case of a shop, 100 W, or if greater, 1½ W per sq ft of floor area in the windows, and in the case of other premises, 100 W for each entrance used by customers. The prohibition on the use of electricity supplied by an Area Board for other forms of advertisement lighting, and restrictions on the total wattage used in shops, etc., remain in force.

Traders' organisations have undertaken to effect equivalent economies inside buildings so that no additional load will be placed on the electricity supply system. They are to recommend to their members, also, that appropriate notices be displayed explaining that such equivalent economies are being made.

Radio Load Shedding Warning

TECHNICAL arrangements have now been completed between the B.E.A. and the B.B.C. for broadcast warnings to be given of impending power cuts. These are to start next Monday, October 29, and will be broadcast in the Light Programme on the 1,500-metre wavelength at any time between 7.30 and 12.30 in the morning and 3 and 6 o'clock in the evening on the five weekdays. The warnings can only be issued after the decision to shed load has been taken in the National Control Centre, and the actual load shedding within a few minutes of widespread breakdown of supply is to be avoided.

New Club is formed at Newport

FURTHER to our report in these columns on October 4, we now learn that it has been decided to go ahead with the establishment of a Newport and District Electric Club. About 60 persons attended a meeting at the Tredegar Arms Hotel last week and appointed officers and a committee of six. Two additional members are to be appointed to the committee by the E.C.A. This new club is open to all members of the electrical industry in Monmouth and Glamorgan, the annual subscription being 10s. for adults and 5s. for those between the ages of 16 and 21. Meetings will be held on the second Tuesday of each month. Full details of the Newport club may be obtained from the hon. secretary, Mr. F. C. Robinson, c/o Santon Ltd., Somerton Works, Newport, Mon.

61 Countries at Utrecht Fair

PROVISIONAL results of the 57th International Utrecht Fair, held between September 11 and 20, show that visitors represented some 61 countries. Although the majority naturally came from neighbouring countries, there were many who travelled from lands as far away as South America, India and Pakistan, and Australia. We note that the next Fair will take place from March 25 to April 3, 1952.

Hoover Display Contest

LAST Monday saw the opening of Hoover Ltd.'s autumn window display competition, which is to continue until November 3. Once again there is an inviting list of prizes, headed by the special challenge cup for the winner. The competition has been divided into three classes, for Electricity Boards, department stores and home furnishers, and electrical contractors and ironmongers, in each of which there are cash prizes of 50, 30 and 20 guineas to be won. The cup will, of course, go to the best display of all, the successful contestant gaining a cash prize of 100 guineas instead of the 50 guineas. Hoover branches will also have the opportunity of winning £15 15s. in a special contest after the national campaign. Entry cards should be submitted and photographs sent to the company's Sales Promotion Dept., Perivale, Greenford, Middlesex.

First Half-Century

The application of electricity for heating and cooking purposes has not received from the industry the attention that it deserves. Those firms that pay special attention to this branch of work may almost be counted on the fingers of a single hand. It is natural, of course, that preference should be given to other branches that are more immediately profitable, but, nonetheless, it is a pity that so little has been done to develop the use of electric energy for heating as well as lighting.
—*From our issue of October* 24, 1901.

The directors, and staff past and present, of the "Electrical Times" and their wives at a dinner held at the Cafe Royal, on Friday, to celebrate the completion of sixty years of publication

Family Party

FORTY-THREE members past and present of the staff and their wives were the guests of the directors last Friday at a dinner, to celebrate this journal's diamond jubilee.

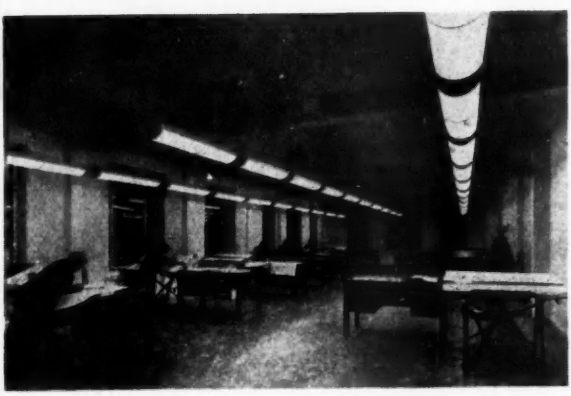
Toast of "The ELECTRICAL TIMES" was proposed by Mr. J. R. Keir, who retired in 1946 after 45 years' service, and responded to by Mr. L. T. Newell, chairman of the Board. Mr. A. H. Brewster (director, "E.T.") proposed the toast of "The Staff," to which Mr. R. Baldwin (editor and managing director) replied. It had been hoped that Mr. Robert Hughman, who retired as managing director in 1947 after 56 years with the journal, would have been present, but to the regret of all concerned, his health did not permit, and his greetings to the "E.T." family and good wishes for its continued prosperity to the centenary mark, were conveyed in written form. Old-timers who were able to be present, however, included Mr. F. W. Warner (1917-1945), Mr. V. G. Kately (1920-1951), Mr. W. E. Hillyard, associated with "E.T." since 1894, and Miss A. H. Rigden, secretary from 1911 to 1946. These four, with Messrs. Hughman and Keir, totalled over two centuries of service between them.

Fawley Telephone Exchange

ONE small though important appendix we might add to our report on the Fawley refinery (September 20 issue) concerns the installation of a Strowger 600-line private automatic telephone exchange by Communication Systems Ltd. The initial capacity of this exchange is 450 extensions, including fire and accident reporting. Notable features of the installation include the provision of a number of flameproof telephones, relays and bells, and portable telephone instruments for use on board tankers when moored. Much of the cable used was treated to withstand sulphur fumes and sea air corrosion. Equipment was designed and manufactured by Automatic Telephone and Electric Co. Ltd.

Lighting in Four Albert Halls

HAVING covered the story of plant installations at the new Fawley refinery (see September 20 issue), it will not be amiss to record some details of the lighting schemes in administrative and social buildings and laboratories, which were the sole responsibility of the General Electric Co. The administrative offices, which incidentally are four times the size of the Albert Hall, consist of one or more bays. The arrangement adopted in most cases comprised three 5ft 80 W fluorescent fittings in each bay, two placed longitudinally and one transversely. Decorative fittings with cream stone-enamelled sheet metal bodies and fluted glass enclosures have been used throughout. Most of the 448 units employed are for two



A view of the drawing office at Fawley refinery, showing G.E.C. lighting fittings suspended from the ceiling. Top canopies were provided for attachment to suspension rods. As a rule in this installation fittings were mounted flush with the ceiling

lamps, but the arrangement necessitates only one, a second to be added later if required.

In the laboratories general lighting has been provided by twin-lamp opal "Perspex" trough reflectors; in some rooms, however, tungsten flameproof fittings have been installed. The new clubhouse, which includes a main hall and cinema, is illuminated by semi-indirect lighting from 5 ft 80 W lamps in twin-lamp fittings mounted in a cornice. Ten special decorative wall brackets for 200 W tungsten lamps provide supplementary lighting. The same company also supplied conduit, cables, switchboards and distribution boards. The whole installation cost about £93,000, and contractors were T. Clarke and Co. Ltd.

Common Faults in Welding

AN illustrated wall chart entitled "Faults in Arc Welds" has just been published by the British Welding Research Association. Measuring approximately 3 ft by 2 ft and printed in two colours, it has 37 half-tone pictures depicting common faults which can occur in metal arc welding of steel. Copies of the chart may be obtained from the Association's Publications Dept., 29 Park Crescent, London W.1, price 7s. 6d.

Help with Advertising Literature

A NEW scheme to help stockists in the preparation of their own catalogues and advertising matter has been announced by Falk, Stadelmann and Co. Ltd. The company is to provide electros of a number of their appliances, including the "Gad-about" iron, "Robot" toaster and "Creasette" trouser press, so that dealers may save considerable sums in the production of appropriate literature. We understand that most of Falk's stockists have already been notified of the arrangement, but those who have not are invited to contact the company.

Diesel-electric Loco for B.R.

LAST week at Waterloo, schoolboys had another engine to record in their notebooks, when diesel-electric locomotive No. 10202 went into regular service on the Southern Region of B.R. Its first main-line trip was from London to Exeter and the West of England. The diesel engine and electrical equipment were manufactured by the English Electric Co. Ltd., and mechanical parts by B.R. It has a 16-cylinder vee-form four-stroke pressure-charged engine developing 1,750 b.h.p. This drives a generator which in turn supplies the power to six nose-suspended traction motors. The locomotive weighs 135 tons and can be operated singly or in multiple units to haul expresses at speeds of over 100 m.p.h. Like its fellow electric trains, it is notable for rapid acceleration and smooth running.

British Railways' new diesel-electric loco No. 10202 at Waterloo Station before its first main line run to Exeter last week

To Study Production Control

A SPECIALIST team is to be sent to the U.S. to investigate the processes of production control from final design to despatch. The trip is being arranged under the auspices of the Anglo-American Council on Productivity, which will have the technical assistance of the E.C.A. It is being sponsored by the Institution of Works Managers, the Institution of Production Engineers, the Purchasing Officers' Association, and the F.B.I. We note that Dr. John Barnett, technical manager and chief inspector of Thorn Electrical Industries Ltd., Enfield, is in the party.

B.T.H. S. & A. Club's 25th Birthday

TWENTY-FIVE years of existence and a membership of 750 were celebrated last Thursday at a dance given by the B.T.H. (Willesden) Social and Athletic Club. Among the guests were Mr. E. H. Ball (managing director, B.T.H.) and a number of celebrities in the sporting world. The Sports Club existed in a sporadic manner as a number of isolated sections from the opening of the Willesden works in 1913, but it was not until 1935 that the various activities were co-ordinated within a single framework which now covers activities as widely separated as boxing and chamber music, netball and amateur cinematograph work.

Foreign Vacations

AN increase of 761 in the number of students sent abroad for experience in industry and commerce is noted in the fourth annual report of the International Association for the Exchange of Students for Technical Experience. The total number for

A new section of a culvert lying on the banks of the Volga prior to its being laid on the bed of the river. It is part of the construction work now in progress on the Kuibyshev hydro-electric project. The culvert, part of which is pictured here, is to be almost one kilometre long

whom arrangements were made was 2,433, and the number of countries participating in the scheme was increased to 16 by the addition of Iceland, Israel and Spain. The report, which is published with the financial assistance of Unesco, gives details of the plans for 1952, and reviews the experiences of both students and firms in 1951. Further details of the Association are obtainable from the general secretary, Mr. J. Newby, Imperial College, South Kensington, London S.W.7.

E.I.B.A. Dance in Birmingham

FIVE hundred or more people attended a most successful annual dance and carnival, held by the Birmingham branch of E.I.B.A. It took place at the G.E.C.'s Witton works, and dancing and side shows continued into the early hours of the morning. As a result of this function, it is expected that a further substantial contribution will be made to the Association's funds.

Pithead Lighting

MUCH has been written from week to week of street lighting installations, so that it is something out of the ordinary to get away from the main thoroughfares to a pithead road in Monmouthshire, where a recent scheme will brighten the lives of night shift miners. The work was carried out by Beynon Pit's own electrical engineering staff with equipment supplied by the G.E.C. "Three-eighty" fluorescent lanterns were used, mounted on 25 ft Concrete Utilities columns. Each lantern houses three 5 ft 80 W warm white lamps with a spacing of 105 ft. This pithead, incidentally, has undergone an appreciable transformation in recent months, a cheerful appearance having been created by the addition of ornamental gardens. The new lighting scheme will undoubtedly do much to enhance these improvements.

A view of the road leading to the pithead at Blaine, Monmouthshire, where fluorescent lighting forms part of sundry improvements to brighten the unenviable work of night shift miners

Wiring Test wanted in Prefabs

RESIDENTS in some 680 prefabricated houses in the Manchester area are demanding an inspection of the electrical wiring in the bungalows. A petition to this effect is being sent to the Corporation and later to the Home Secretary. This action follows a fire in one of the houses last week which completely demolished the home. The petition states that the residents are deeply concerned over recent fires which are believed to have been caused by faults in the wiring. We understand that in most of the "prefabs" the main switches are about 15 ft from the meters and seem to be affected by steam from the bathroom. There have also been a number of complaints of electric shocks. Following previous complaints the houses were checked in 1949.

E.A.W. Branch's 21st Birthday

THE Torquay branch of E.A.W. celebrated its 21st birthday a few days ago with a dinner at the Recarn Hotel. Among the speakers was Mr. S. F. Steward, chairman of S.W. Electricity Board.

Checking the electrolyte level of cells in the battery room of York's new central signal box. The special telephone network, train description apparatus, clocks, public address systems and other facilities are powered by batteries supplied by Chloride Batteries Ltd. Description of the box appeared in our June 7 issue

who said that even allowing for the new standardised charges, electricity was still a cheap service. He called for a greater understanding by the public of power cuts, and went on to say that if only one in five of consumers had an electric fire and switched off one bar during peak periods, the problem of load shedding would be solved. Other speakers at the celebration included Dame Caroline Haslett, director of E.A.W., and Mrs. V. F. Gresham, branch president.

Pamphlets on Measurements

THE National Physical Laboratory is preparing a new series of pamphlets describing the units and standards of measurement used there. The first, entitled "Length, Mass, Time," has just been published by the Department of Scientific and Industrial Research, and is available at H.M.S.O., price 9d. An example of the accuracy attained in measurement of standards is contained in the section on time, where a description of precision clocks states that, due to the nature of radio signals through Rugby from Greenwich, precision of their comparison with the clocks is limited to a few tenths of a thousandth part of a second, but the inter-comparison of the clocks themselves can be carried out considerably more accurately.

Supper and Dinner

TWO notable social functions have taken place in the past week or two. Over two thousand guests is no small number to accommodate for supper, but the proprietors of New Brighton Tower successfully overcame the problem when members of the staff of B.I.C.C. met there for a party. There were 2,300, to be exact, and some 70 coaches were needed to carry them from all the factories within the company's northern group.

Smaller in size, though not in importance, was the sixth annual dinner of Johnson and Phillips' Foremen's Association. This event took place at McLeod Restaurant, Woolwich, and members and guests numbered 160. The dinner was followed by a concert.

G.E.C. Dramatic Society

"THE Hasty Heart," John Patrick's play set in a military hospital in S.E. Asia, was chosen by the Dramatic Society of the General Electric Co. Ltd., for this season's venture. In this practically all-male cast (Joan Middleton as the nursing sister being the only exception), Ian Stewart as Lachlan, the dour Scots lad with but a short time to live, had the star part, and played it brilliantly, backed up by some fine performances from the rest of the cast, including Keith Clifton (orderly), Michael Molloy ("Yank"), Gordon Singleton ("Digger"), John Hanhart ("Kim"), Benny Nightingale ("Blossom"), Frederick James ("Tommy") and Millar Dixon (the Colonel). William Peacock was the producer.

NEWS IN BRIEF

We hear that the Anglo-Argentine General Electric Co. entertained representatives of the Argentine Ministry of Public Works, to mark the completion of a 150,000-ton grain elevator, for which the company supplied electrical equipment.

Dexion Ltd., are staging an exhibition of their products at Church House, Westminster, between October 23 and 30 (except Sunday).

A resolution adopted by Caernarvonshire County Council opposes any Bill which might be presented to Parliament by the B.E.A. if it included hydro-electric schemes in the county.

The High Commissioner for the Union of South Africa, Dr. A. L. Geyer, last Friday visited the B.T.H. works at Rugby. The same evening he was guest of honour at the company's Overseas Association's annual gathering.

A demonstration of aluminium conductor cable jointing was given recently to the S. Wales Electricity Board by W. T. Glover and Co. Ltd.

Current display at headquarters of A.E.I. Ltd. and the B.T.H. Co. Ltd., showing some of the more popular fluorescent lighting fittings. One group shows the more decorative types and a second group, bare lamp and reflector fittings for industrial applications

Electric Supply News

Cambridge

The Corporation Public Works and Town Planning Committee has raised objections to proposals of the Eastern Electricity Board for the erection of an overhead line from Little Barford to Cambridge. The city surveyor has put forward an alternative northern route which has been supported by the County Planning Officers.

Cumberland

The Parish Council of Holme St. Cuthbert is awaiting the decision of the North-Western Electricity Board regarding the proposed supply of electricity to the parish. The Board offered a supply if it had a guaranteed income of £3,200 per annum for five years. The Parish Council offered £3,000 annually, but a decision of the Board whether this offer can be accepted is still awaited. The parish has 160 houses.

Eire

In response to representations made by various organisations using electric signs, outside display lighting, and "after hours" shop window lighting, the E.S.B. has rescinded the restriction prohibiting the use of electricity for signs, outside display lighting and shop window lighting, until after 7 p.m. each day. Such equipment may now be switched on when required, but users must not exceed the average daily consumption allotted to this purpose.

Isle of Man

After much debate, it has been finally decided that the new Ballachrink housing estate shall be all-electric. Originally the Onchan Commissioners agreed on all-electric houses, but the gas company protested and the Local Government Board stepped in. But when the Commissioners decided to give the 100 tenants the option of gas or electricity, it was found that the gas company were not prepared to lay on gas free along with the electricity undertaking. So, in the interests of economy, the Commissioners have decided that the houses shall be all-electric.

Malvern

Herefordshire would be without a good winter electricity supply because overhead power lines had been disallowed over the Malvern Hills, stated Alderman H. Leason, at a meeting of the Midland Electricity Consultative Council last week. It was explained that the Minister of Fuel and Power has given his consent to the erection of a 66kV line into Herefordshire with the exception of four spans over the brow of the Malvern Hills. These were to be underground, but as it was not possible to get delivery of such cable for six months the work could not be completed this winter.

Orkney

The North of Scotland Hydro-Electric Board has informed Orkney County Council that a survey has been conducted of the main islands of the county and schemes prepared for submarine cables and, where necessary, for independent diesel generating plant. Arrangements for the future would to some extent be made on the experience gained in the use of submarine cables; an accurate forecast of when plans would be put into operation was difficult at a time when materials were scarce and priorities necessary.

N. Scotland

Perth and Kinross Joint County Council has decided to withdraw their objections to the Breadalbane scheme of the North of Scotland Hydro Electric Board, while reserving the right to make representations to the Secretary of State if hydro-electric developments in Perthshire infringe the rights or properties of ratepayers in the future.

South Eastern

Following the example of the Midlands Board (see ELECTRICAL TIMES, Sept. 27, p. 584), the South Eastern Electricity Board has now applied to the Minister of Fuel and Power for consent to alter the type and/or voltage of electricity non-standard systems in its area. At March 31 last, the Board supplied 78,668 d.c. consumers and 643,384 consumers on non-standard voltage a.c. systems. It is not intended to carry out a wholesale conversion, of course. The alteration will take place gradually over a considerable period as and when circumstances permit, the Board points out.

LIGHTING SCHEMES

Barrow-in-Furness.—The Highways Committee has approved a scheme for street lighting on Ormsgill estate extension, at a cost of £2,600.

Bexley (Kent).—Improved lighting in Welling Way, Hook Lane and Brampton Road will cost £3,852.

Blackpool.—Mr. H. Carpenter, lighting superintendant, has submitted a scheme for next year's illuminations, estimated to cost £65,000. The Highways Committee has approved a scheme, to cost £4,720, for street lighting on part of the Mereside Estate, involving 111 concrete columns with 100W tungsten lamps.

Bolton.—It is hoped to convert the lighting on several local bus routes from gas to electricity. This year's plans include Vernon St. to Eskrick St., Thynne St., Crook St., Waterloo St., Kay St., and Darby St. to Hulton Lane.

Dartford.—The Highways Committee has approved a scheme for street lighting in Burnham Road at a cost of £2,240.

Essex.—There is to be improved main road street lighting at Great Baddow, Broomfield and Writtle.

Hebburn-on-Tyne.—The U.D.C. is to spend £2,100 providing class A lighting on the new £30,000 extension of Campbell Street.

Sandwich (Kent).—The Council has approved a scheme for conversion of street lighting to electricity spread over a number of years.

Swanage.—The U.D.C. is to investigate the question of conversion of street lighting to electricity.

Thornton Cleveleys.—The Street Lighting Committee has a £55,000 plan for improved street lighting. A special sub-committee is to draw up recommendations for the first part of the scheme, which will cost about £15,000.

Woolwich.—The Borough Council is recommended to approve the relighting of abandoned tramway routes between Lee Green and Beresford Square, at a cost of £39,873; also the relighting of Eltham High Street, at an estimated cost of £4,867.

Company Activities

Associated Electrical Industries

As a result of the recent offer which closed on September 30, 2,176,491 8% "A" Preference Shares of the company (out of a total issued of 2,669,240) have been converted into 4½% "B" Preference Shares. The Preference shares of both classes have now been converted into Stock.

E. K. Cole Ltd.

Renounceable allotment letters in respect of the new 200,000 Ordinary 5s. shares were posted to stockholders last week. Dealings in the new stock started on Monday.

Cable and Wireless

Consolidated profit and loss account for the year to March 31 last shows messages, wayleaves and telephone receipts amounted to £11,164,301 (*£14,950,559 for previous 15 months*), less outpayments to Government for taxes £960,648 (*£900,887*), leaving a balance of £10,203,653 (*£14,049,672*). Adding sundry receipts and investment income, the total becomes £10,764,358 (*£14,675,346*). Working expenses at stations absorb £4,457,961 (*£8,023,133*), maintenance of cables, less expenditure charged to provision for deferred repairs £1,749,830 (*£1,658,494*), add deferred repairs provision of £225,450 (*78,949*), general administration £444,940 (*£776,181*), rent and payment for cables and landlines £135,541 (*£254,402*), pensions £635,485 (*£746,501*), depreciation £616,382 (*£745,436*), renewal of cable stations and landlines £34,749 (*£26,582*), increased cost of renewal of ships and wireless assets £191,277 (*£188,287*), taxation abroad, not relieved in U.K. £40,000 (*219,230*), leaving a profit of £2,232,743 (*£1,893,699*).

Newton Brothers (Derby) Ltd.

There are no present signs of any falling off in demand for the firm's specialised products, Mr. F. V. Pope, chairman, stated at this meeting. By continuous research and by constant improvement of plant and methods of production, they were endeavouring to counteract as far as possible the effect of the rising costs of labour and materials.

Richard Johnson, Clapham & Morris

Trading profit for the year ended June 30 last was £75,427 (*£45,687*), plus other income £2,790 (*£2,789*). To depreciation £3,161 (*£1,848*), audit fee £470 (*£550*), and directors' fees £1,067 (*£600*). To employees' bonus £7,500 (*£6,000*), taxation £38,793 (*£22,520*) and general reserve £15,000 (*£5,000*). The final dividend is again 15% and bonus 10%, making 30%, and there is £10,787 (*£9,617*) carried forward.

Radio and Television Trust

In the full report for the year to March 31 last, group current assets total £614,534 (*£753,180*), of which stock and work in progress amounts to £334,857 (*£436,431*), and current liabilities and provisions to £1,097,284 (*£1,180,644*). The directors state that they consider that the prospects of both operating companies should continue to improve during the next few years unless the raw material position worsens. Both companies have a satisfactory proportion of priority orders. For this reason the board consider that no immediate attempt should be made to dispose of these companies, though they see no reason to change their previously expressed opinion that it may ultimately be in the best interests of the stockholders to do so. A resumption of the Preference and Sinking Fund certificates service is unlikely while the bank overdraft position remains at its present level.

William Steward & Co., Ltd

The capital of this firm of electrical engineers and contractors has been increased to £20,000 by the creation of 10,000 additional shares of £1 each. These are to be issued on such terms and conditions as the directors may decide.

Dividends Declared

British Electric Traction.—Interim dividend of 7½% on the Deferred Ordinary and the "A" Deferred Ordinary.

Ever Ready (Gt. Britain).—Interim Ordinary dividend of 15% (*same*) payable on December 1.

Ever Ready Trust.—Interim Ordinary dividend of 5% (*same*) on larger capital.

Glenfield and Kennedy Ltd.—Interim Ordinary dividend of 5%, on capital increased in May by 100% scrip bonus. The interim is in line with the chairman's earlier statement that it was proposed at the first opportunity to adjust the interim dividend so that it may represent a somewhat greater proportion of the total dividend of the year.

Hopkinsons Ltd.—Interim dividend of 7½% (*same*).

London Electric Wire Co. and Smiths Ltd.—Interim dividend 4% (*same*) on larger capital.

Commercial Information

CONTRACTS OPEN

HOME

Oct. 27.—Godalming T.C. Extension of electrical installation in some 196 houses at Ockford Ridge. Borough Engineer and Surveyor, Branksome, Filmer Grove.

Oct. 27.—Londonderry. Electrical installation at Drumahoe primary school. County Education Architect, New Row, Coleraine.

Oct. 27.—Shepton Mallet (Som.) U.D.C. Electrical work in 16 houses on Ridgeway estate. A. D. Stockdale, clerk, Council Offices, Market Place.

Oct. 27.—Wisbech (Ely) R.D.C. Wiring of 14 houses and 12 bungalows in various parishes. Architect is S. G. Bailey, Council Offices, Alexandra Road.

Oct. 29.—Exeter T.C. Supply of switchgear for Pynes waterworks. John Brierly, City Engineer, Surveyor and Water Engineer, Municipal Offices, 7 Southernhay West, Exeter.

Oct. 29.—Manchester. Supply and erection of a passenger lift at City Training College. City Architect, Town Hall. Deposit £1 1s.

Oct. 29.—Whitewell (Belfast). Electrical installation in 8 shops and 8 flats for N. Ireland Housing Trust. Trust is at 12 Hope St., Belfast. Deposit 10s.

Oct. 31.—Brighton T.C. Dismantling the existing passenger lift and installing a new one at the Town Hall. Borough Engineer and Surveyor, 26-30 King's Rd., Brighton.

Oct. 31.—Plymouth. Electrical installation in secondary modern school at Peverell. Applications by above date to H. J. W. Stirling, City Architect, Seymour Road.

Nov 1.—Oxfordshire. Electrical installation in proposed secondary modern school, Witney. Applications by above date to G. R. Hutton, County Architect, 3 Becket St., Oxford. (Advertised in this issue.)

Nov. 1. — Newbiggin U.D.C. Electrical installation in 12 houses at Spital. H. S. Robson, engineer and surveyor, Council Offices. Deposit £2 2s.

Nov. 2—Billingham U.D.C. Street lighting included in works on Roseberry Rd. development scheme. Eric G. Lediard, chartered civil engineer, 4 Eldon Sq., Newcastle-on-Tyne. Deposit £5 5s.

Nov. 2.—Edinburgh. Renewal of lighting and power installation at Education offices in St. Giles St. City Architect, City Chambers.

Nov. 3.—Long Benton U.D.C. Electrical installation in 16 houses at Benton (contract 26) and 10 bungalows at Annitsford (contract 27). A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

Nov. 3.—Peterborough. Lighting and power installations to 14 shops, branch library, 16 flats, 14 garages and stores on Dogsthorpe estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Nov. 5.—Dewsbury T.C. Electrical work in proposed occupation centre at Savile Town. Borough Architect and Buildings Surveyor, Town Hall.

Nov. 5.—Downpatrick (Down) U.D.C. Electrical installation in 18 houses in course of erection. T. M'Clean, architect, Irish Street.

Nov. 5.—St. Helens T.C. Supply and erection of (a) 39 concrete columns with 80 W VHPM lanterns on Cecil St. estate; and (b) 28 concrete columns with 125 W HPMV lanterns and 16 concrete columns with 80 W HPMV lanterns in Parade St. area. M. Ward, Borough Engineer, Town Hall.

Nov. 6.—Derby T.C. Supply, erection and installation of Group A sodium discharge lighting along Queensway, trunk road A.5111. Borough Engineer and Surveyor, Council House. (See October 18 issue.)

Nov. 6.—Southport T.C. Conversion from gas to electricity in 182 houses on Essex Rd. estate. Borough Architect and Town Planning Officer, Pavilion Buildings, Lord Street.

Nov. 7.—Sutherland. Electrical work in erection of 42 houses on various sites. Architect is E. W. Brannen, Carnegie Buildings, Dornoch. Deposit £1 1s.

Nov. 8.—Littlehampton U.D.C. Wiring to electric lighting and power points in 16 maisonettes. Engineer and Surveyor, Council Offices. Deposit £1 1s.

Nov. 9.—Bingley U.D.C. Tenders invited for (*a*) supply, erection and installation of 18 concrete lighting columns, lanterns and auxiliary equipment in Mornington Rd., and (*b*) erection and conversion of gas lighting columns and supply, erection and installation of 17 swan-neck brackets, lanterns and auxiliary equipment in Chapel Lane and Dubb Lane. J. S. Lattin, Engineer and Surveyor, Town Hall. Deposit £2 2s. in respect of each scheme. (See Oct. 4 issue.)

Nov. 13. — Ince-in-Makerfield U.D.C. Electrical installations in 40 houses on Battersby St. site. Surveyor, R. Lewis, Town Hall, Ince, Nr. Wigan. Deposit £1 1s.

Nov. 14.—N. Ireland. Electric lamps and other requisites are included among supplies required by Lagan Valley and Lisburn Hospitals during year beginning Jan. 1, 1952. Secretary, S. Antrim Hospital Management Committee, Dublin Rd., Lisburn.

Nov. 15.—Manchester. Electrical installation at Hall Lane police station, Wythenshawe. City Architect, Town Hall. Deposit £1 1s.

Nov. 17.—Windsor T.C. Supply of electric lamps, fittings and cable during year ending Dec. 31, 1952, G. S. Baker, Borough Engineer, Kipling Memorial Building, Alma Road.

Nov. 21. — Formby (Lancs) U.D.C. Supply of concrete street lamp columns required during year ending Dec. 31, 1952. Engineer and Surveyor, Council Offices.

Nov. 21.—Wiltshire. Provision and installation of electrical system in primary school at Lynham. Applications to F. I. Powden, county architect, County Hall, Trowbridge, by Oct. 31. Deposit £2 2s.

Nov. 23.—Belfast. Supply and erection of (a) two 48 in. bore and two 72 in. bore motor operated sluice valves for condenser circulating water culverts; and (b) seven penstocks 5 ft by 10 ft, three 3 ft by 13 ft and one 6ft by 13 ft, motor operated with emergency hand operating gear. Also one road transport weighbridge capable of weighing up to 30 tons and with indicating and ticket printing recording equipment. All for Electricity Dept. Merz and McLellan, consulting engineers, Carliol House, Newcastle. Deposit £5 5s. (Advertised in this issue.)

Nov. 30.—Salford. Supply of one 25-ft 3-section motor tower wagon mounted on ¾-ton Karrier C.K. 3. low-loading chassis. Street Lighting Superintendent, Bloom St., Salford 3. (See October 18 issue.)

Dec. 7.—Belfast. Supply and erection of low pressure piping installation, including valves, auxiliary pumps, tanks, water softening plant, air compressor and associated equipment. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See October 18 issue.)

Dec. 17.—Rugby T.C. Four sets of electrically driven vertical propeller pumps and two electrically vertical sludge pumps and ancillary equipment. Engineers, John Taylor and Sons, Artillery House, Victoria St., S.W.1. Deposit £5.

No date stated.—Alnwick (Northumberland) U.D.C. Conversion of part of town's street lighting from gas to electricity involving some 139 lamps. Apply to Surveyor, Council House, Wagonway Road.

No date stated—Cumnock and Holmhead T.C. Electrical work in erection of 16 houses, on Drumbrochan site. R. D. Hunter, Town Clerk, Cumnock.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Nov. 12.—Portugal. Sundry machinery and apparatus, including washing machines, hydro-extractors, driers and lighting fittings, all of which must be electrical and suitable for 220/380 V 50 c/s, for laundry at Lisbon Training Hospital. Administrative Commission of New University Buildings, Avenido de Antonio Serpa, Lisbon. B.o.T. (Ref. CRE (IB) 72295/51)*.

Nov. 12.—Portugal. Supply and installation of kitchen equipment for Training Hospital, Lisbon (to feed approx. 200). All to be electrically operated and suitable for 220/380 V, 50 c/s supply. Base for tender is £55,000 and contractor will be required to install ventilation, piping and lighting equipment. Admin. Commission, New University Bldgs., Avenida de Antonio Serpa, Lisbon. Deposit £1,375. B.o.T. (Ref. CRE (IB) 72296/51).*

Nov. 14.—India. Supply of one journal regrinding machine with electrical equipment for 400/440V, 3-phase, 50 c/s, a.c. supply, for Directorate General of Supplies and Disposals, Shahjahan Rd., New Delhi. B.o.T. (Ref. CRE (IB) 73343/51)*.

Nov. 22.—India. Supply of Pattern Miller machine for woodworking shop with electrical equipment for 400 V, 3-phase, 50 c/s, a.c. supply. Directorate-General of Supplies and Disposals, Shahjahan Rd., New Delhi. B.o.T. (Ref. CRE (IB) 72623/51).*

Nov. 27.—New Zealand. Tenders invited by Ministry of Works for manufacture and supply of fabricated steel intake gates and frames, electric winches, stoplog frames, bypass valves and screens, etc., for six intakes at Waitaka power station. Documents from Govt. Offices in London.

Nov. 28.—India. Directorate General of Supplies and Disposals requires 32 8½-in. centre all-geared SS and SC heavy motor-driven lathes, and one 12-in. duty-type centre all-geared SS and SC motor-driven lathe—all with electrical equipment suitable for 400 V, a.c., 3-phase, 50 c/s. Directorate is in Shahjahan Rd., New Delhi.

Nov. 23. — Ceylon. Tenders invited for supply of (among other items) five diesel electric generating sets 5 kW, and one portable set 20 kW. Documents from Director of Irrigation, P.O. Box 500, Secretariat, Colombo. Deposit Rs. 100.

Nov. 26. — Uruguay. Usinas Electricas y Telefonos del Estado requires supply of 300,000 metres of double vulcanised insulated conductors. Gerencia Administrativa de la U.T.E., Paraguay 2431, Montevideo. B.o.T. (Ref. CRE (IB) 73234/51)*.

Dec. 12.—Australia. Supply of radio communication equipment for Capricornia Regional Elect. Board. Tenders to Secretary, State Electricity Commission, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE (IB) 73068/51).*

Jan. 3, 1952. — South Africa. Tenders invited by Rand Water Board (contract 775) for supply, erection and commissioning of three electric motor-driven main pump sets and booster pumps for Zwartkopjes pumping

Your Queries — Answered

"Stabilistor" voltage regulator, makers of? L.E.—Westinghouse Brake and Signal Co. Ltd., 82 York Way, King's Cross, N.1. (21742)

"Aloxite" brush bedding compound, makers of? T.E.—Carborundum Co. Ltd., Trafford Park, Manchester. (21756)

"Pyrobit" neon indicator, makers of? R.W.—Acru Electric Tool Mfg. Co. Ltd., 123 Hyde Rd., Ardwick, Manchester. (21762)

"Limco" plugs and sockets, makers of? B.E.—We presume this enquirer refers to "Lico" made by the London Instrument Co. Ltd., Newnham Mill, Cambridge. (21769)

"Prelect" irons, makers of? G.D.—T. Price and Sons (Stampers) Ltd., Spring Hill Passage, Birmingham. (21776)

Bronchitis kettles, makers of? G.D.—C. H. Blackburn and Co. Ltd., 10 Grays Inn Rd., London W.C.1. (21725)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"Sumara" fires, makers of? M.A. (21783)

station. Chief Engineer, Johannesburg. Deposit £(SA)3.

Jan. 16, 1952.—S. Rhodesia. Supply of one 11 kV high pressure turbo-alternator for most economical rating of 16,000 kW and maximum continuous rating of 20,000 kW, etc., for Umniati B power station. Elect. Supply Commission, P.O. Box 377, Salisbury. B.o.T.*

Jan. 30, 1952.—S. Rhodesia. Supply and erection of one 3-phase, 11 kV high pressure steam turbo-alternator for most economical rating of 8,000 kW and maximum rating of 10,000 kW; also condensing and evaporating plant for Shabani No. 2 power station. Electricity Supply Commission, P.O. Box 377, Salisbury. B.o.T. (Ref. CRE (IB) 72881/51)*.

Feb. 5, 1952.—New Zealand. Supply of one 10,000 kVA, 11 kV synchronous condenser for Invercargill substation. State Hydro-Electric Dept., Wellington. Deposit £100.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ .s d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, ,, "English" quality	176 10 0	
Tin (99·99·75%) ... ...(Cash)	1020-1030	—
,, (3 months)	£985-987½	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

CONTRACTS PLACED

Basingstoke. T.C. Provision and installation of fluorescent street lights, Revo Electric Co., Ltd., £4,886.

Newcastle-on-Tyne. Electrical repairs to council houses over period of six months. Bernard Barrie (Newcastle) Ltd.

Chichester. Supply of lanterns and fittings and erection of columns for street lighting in Bognor and Wyke Rds., G.E. Co., and Concrete Utilities, Ltd., £1,170.

Norwich. Electrical installation at Lakenham secondary modern school, Johnson Pearce and Co., Ltd. £9,965.

Dublin. Supply of fluorescent lighting fittings to office building in Store St.: (a) sheet steel troughs, G.E.C. Ltd.; (b) louvre panels and associated control gear, Sheet Metal Engin'ing Ltd.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Malme Electro-Medical Laboratories Ltd. Resolution for voluntary winding-up was passed at meeting on Oct. 14, and William A. Byars, 51, Coleman St., E.C.2, was appointed liquidator. Creditors should send particulars to liquidator by Nov. 14.

Edgworth Electrics Ltd. Creditors are asked to send particulars to liquidator, A. W. Hunter, 418-422, Strand, W.C.2, by Nov. 24.

Sherborne Electrical Co. Ltd. Particulars should be sent by creditors to liquidator E. B. Bate, 25, Baldwin St., Bristol 1, by Nov. 9.

First Meeting

London. Modern Electric Power Products Ltd., B.E.M. Works, Mitcham. Winding-up order made on Oct. 8 from petition presented on Sept. 20. Meetings of creditors and contributories to be held at Inveresk House, 346, Strand, W.C.2, on Oct. 31 at 2.30 and, 3 p.m. respectively.

Intended Payment to Preferential Creditors

London. Eden Machine Tool Co. Ltd., Edenbridge, Kent, electrical engineers and toolmakers. Last day for receiving proofs, Oct. 31. Liquidator is John Melville Clarke, Official Receiver, Inveresk House, Strand, W.C.2.

BANKRUPTCY ACTS

First Meeting

Great Yarmouth. Harry W. Daldry, electrician, trading at 168 Bells Rd., Gorleston-on-Sea. Meeting at Official Receiver's Office, Castle Chambers, Opie St., Norwich, on Oct. 31 at 11 a.m., and public examination at Town Hall, Great Yarmouth, on Nov. 22 at 10.30 a.m. Date of receiving order, Oct. 10.

Order on Application for Discharge

Southend. Arthur Jacobs, electrical engineer trading at 312 London Rd., Westcliff-on-Sea. Discharge suspended for three months and to take effect from Dec. 6, 1951.

Dividends

Wolverhampton. Joseph H. Bourne, trading as "Amplifier Illumination Co." at Rayleigh Works, Powlett St., First and final dividends of 8d. in £ payable at 12 Waterloo Rd., Wolverhampton, on Nov. 6.

Receiving Order

London. Frederick Phillips, electrical contractor trading as "F. Phillips and Son" at 28 Blenheim Terrace, N.W.8. Date of receiving order, Oct. 10.

Intended Dividends

Liverpool. Harold Ward, electrical dealer, trading as "H. Ward" at 107 Aigburth Rd., Liverpool 17. Last day for receiving proofs, Nov. 2. Trustee is Ronald Parkyn Booth, 5 Rumford Place, Liverpool 3.

Southampton. Lancelot E. Lawson, radio and electrical engineer, trading at 1 Northam Rd., Six Dials, Southampton. Last day for receiving proofs, Oct. 30. Trustee is Norman Gurney Randall, Morgan and Co., 100 Park St., Grosvenor Square, London W.1.

Liverpool. Robert L. Foggin, electrical engineer, trading as "Tithebarn Radio Co." at 63 Tithebarn St., Liverpool; as "Crosby Radio Co." at 75 Crosby Rd., North, Waterloo; and as "High Bridge Radio Co." at High Bridge, Newcastle-on-Tyne.) Last day for receiving proofs, Nov. 2. Trustee is A. K. Ferguson, Official Receiver, 25 Water St., Liverpool 2.

Further to our note in the Oct. 4 issue concerning the application for discharge of Royal Ernest Stebbings, The Millman Refrigeration Service, Ltd., 200 Kensington High St., W.8, wish to make it quite clear that the above named has no connection whatsoever with their company and all contact with him was severed in Jan. 1950.

BUSINESS PROSPECTS

HOME

Barking T.C. Alterations and additions to be carried out at factory of British Oil and Turpentine Corporation Ltd. Also consent given to E. Beckwith and Co., Ltd., for addition to their factory.

Belfast R.D.C. Construction of 129 houses at Glengormley. W. D. R. and R. T. Taggart, 36-38 Castle Arcade Buildings.

Bournemouth T.C. Construction of 62 houses and 12 bungalows on Leybourne estate under separate contracts. Borough Architect, Town Hall.

Brighton T.C. First instalment of college of arts and crafts costing £50,000, and adaption of Stanmer House for technical college, £27,000, has been included in next year's building programme.

Cardiganshire. Erection of Ardwyn county secondary school at Aberystwyth. County Architect, G. R. Bruce, County Offices, Aberayron.

Chanctonbury (Sussex) R.D.C. It is proposed to erect 42 houses at Henfield, 32 at Pulborough and 22 at Steyning.

Chelmsford T.C. It is proposed to build a block of 22 flats in Navigation Rd. Architect is Roff Marsh, 109 London Road.

Chertsey (Surrey) U.D.C. Erection of 46 dwellings on Woodham Lodge estate, New Haw. Engineer and Surveyor, Council Offices.

Chichester. S.W. Metropolitan Hospital Board propose to provide additional accommodation at St. Richard's Hospital costing about £10,000.

Coventry. Application to be made for sanction to borrow £22,873 for erection of 24 flatlets at Stonebridge Highway.

Coventry. W. S. Hattrell of Hattrell and Partners, 1 Queens Rd., is architect for rebuilding of Ford's Hospital.

Dorset. Estimates have been given for erection of 11 schools in next year's building programme. They range from £195,700 for Bridport school to £20,990 for Wyke Regis primary infants' school.

East Suffolk. School building programme for 1952-3 has been approved. It involves 5 schools at total estimated cost of £236,287.

Elgin. Approval granted for erection of police headquarters for N.E. Counties Police Board.

Farnham (Surrey) U.D.C. Erection of 28 houses in 10 blocks on Heath End estate. Architect, G. Maxwell Aylwin, 26 West St.

Guildford T.C. Construction of 54 houses at Bushy Hill, Merrow. Borough Engineer and Surveyor, Municipal Offices, High Street.

Harrow U.D.C. Erection of 37 houses in Castleton Rd., 8 houses and 2 shops at Pinner and 6 dwellings at Harrow Weald. Engineer and Surveyor, Council Offices, Stanmore.

High Wycombe. Second phase of new college for further education for C.C. County Architect, County Offices, Aylesbury.

Leeds. Erection of children's home at Cookridge. City Architect, Priestley House, Quarry Hill, Leeds 9.

Lincoln. Council is expected to apply for sanction to borrow £165,086 for construction of 100 houses.

Liverpool C.C. expected to apply for sanction to borrow £1,000 for improvement to lighting installations at various primary schools, and £700 for electric lighting in housecraft and handicraft centres.

Magor and St. Mellons R.D.C. Advance preparations of four sites to be started shortly for erection of 28 houses. Engineer and Surveyor is at Council Offices, Baneswell, Newport.

Middlesbrough. Primary school is to be built on Berwick Hills site. Plans have been prepared for shops on same site and children's home on Beechwood estate. Borough Engineer is J. A. Kenyon.

Stockton-on-Tees. Plans approved for erection of infants' school on Roseworth site. Borough Architect, T. C. Hartley, 28 The Square.

Stroud U.D.C. Construction of 34 houses in three contracts. Engineer and Surveyor is F. Foster Langley, Council Chambers, High Street.

Surbiton T.C. It is proposed to build 40 houses on Chessington Hall estate. Also approval sought for erection of factory for G. Eve and Co.; extension to Toolworks Ltd.'s works, and additions to premises of C. H. Coates Ltd.

OVERSEAS

India. National Industrial Corporation Ltd., of Belanganj, Agra, are interested in obtaining supplies of electric motors, transformers, switchgears, capacitors and condensers.

Australia. F. C. W. Powell and Son, Burrows Rd., St. Peters, Sydney, would like to purchase from U.K. two power driven jib cranes of 3-ton capacity with 100 to 110 ft jibs.

TRADE NOTES

B.E.A.M.A. Contract Price Adjustment Formulae. For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at October 13, 1951, shall be deemed to be 120s.; (*b*) "Costs of Material"—the index figure for intermediate products last published by the Board of Trade on October 13, 1951, is 367·6 and is the figure for the month of September, 1951.

Distributors. Smith's Electric Vehicles Ltd., have appointed Messrs. William Murphy, May St., Belfast, and the Murphy Electric Co. Ltd., 7 Upper Stephen St., Dublin, as their distributors for Northern Ireland and Eire respectively.

Extension. J. Gledson and Co. Ltd., of 48-52 Blackett St., Newcastle-on-Tyne, announce the opening of their new trade showroom and extension of premises.

N.Z. Imports. Electric food mixers are included in further items just released from import control in respect of soft currency sources, announced by the New Zealand Minister in charge of import licensing.

Representatives. Sharp Control Gear Ltd. have appointed J. S. Plumtree and Son Ltd., 104 High Holborn, W.C.1, to act as their sales representatives for London and the Home Counties.

Sales Tax. Under recent Australian Sales Tax Amendments which came into force a few days ago, radio sets, radiogramophones, record players and pick-ups are now taxed at 33⅓%.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

A. Good and Co., Ltd., 203, Regent St., W.1. Manufacturers, wholesalers, importers and exporters of electrical appliances; electricians, etc. Cap.: £100. Subs. Eileen M. Tew, and G. N. Lee.

Electroloid Ltd., Chromaloid Works, Oaklands Rd., Cricklewood, N.W.2. Mechanical, electrical and general engineers, etc. Cap.: £1,000. Dirs.: C. W. J. Morley, and C. A. Plummer.

Ernest S. Till and Co. Ltd., Wolseley Hill, Redding Rd., Eastville, Bristol, 5. Electrical and general engineers, electrical installation contractors. Cap.: £500. Dirs.: E. S. Till, and R. W. Hardwick.

Electrical and Radio Engineers (Hendon) Ltd., 262 Watford Way, Hendon, N.W.4. Cap.: £1,000. Dirs.: T. S. Rey and Dora Rey.

Fortley Repetition Ltd. Excelsior Works, Edward St., Wednesbury. General, electrical and mechanical engineers, etc. Cap.: £7,000. Dirs.: M. Jones, and P. F. Hamilton.

G. Llewellin and Son Ltd., Churn Works, Haverfordwest. Mnfrs. of and dealers in refrigerators, refrigerating plant, etc. Cap.: £100. Dirs.: A. J. B. Llewellin and G. H. M. Llewellin.

Johnson Neon (Liverpool) Ltd., 33, Baker St., Liverpool, 6. Manufacturers of hot and cold cathode luminous tubes and signs of all kinds, electrical contractors and engineers, etc. Cap.: £800. Dirs.: J. Dougherty, and A. Johnson.

Joyce, Loebl and Co., Ltd., Arch Works, Painters Heugh, Dean St., Newcastle-on-Tyne. To take over business of electrical and mechanical engineers, and instrument makers carried on at Newcastle-on-Tyne as "Joyce, Loebl and Co." Cap.: £2,000. Permt. dirs.: H. Loebl, and R. H. Joyce.

Lleyn Sanitary and Electrical Engineering Co. Ltd., 11 Peter St., Manchester 2. Cap.: £3,000. Dirs.: G. G. Jones, G. O. Jones, R. E. Hughes and H. Fitzpatrick.

Modern Teleservice Ltd., 17 London Rd., Alderley Edge, Ches. Radio and television engrs., etc. Cap.: £1,000. Dirs.: D. A. Stephen and Jean A. Stephen.

Milford Constructors Ltd. Engineers, mechanical, electrical, water supply and chemical engineers, etc. Cap.: £100. Subs.: L. I. Phillips, 1, Netley Rd., Barkingside, Ilford, and L. E. Griffett, 35, Lowndes Av., Chesham, Bucks.

Oswald Hughes (Electricals) Ltd., 15, Queen St., Newcastle-on-Tyne. To take over business of an electrical contractor carried on at North Sunderland by Oswald Hughes. Cap.: £2,000. Dirs.: O. Hughes, and T. W. H. Mills.

P. B. Turner and Co. (Electrical Contractors) Ltd., 68, Wharf Rd., Grantham, Lincs. Cap.: £1,000. Dir.: P. B. Turner.

R.T.F. Ltd., 6-7 Water Lane, E.C.3. To enter into hiring, hire purchase and other agreements; dealers in radio, television and electrical equipment, etc. Cap.: £5,150. Dirs.: A. Sproxton and C. Sproxton.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Humitec. 700,802. Class 9. Hygrometers. Standard Telephones and Cables, Ltd., Connaught House, 63 Aldwych, W.C.2.

Mixmaid. 699,454. Class 7. Electric mixing machines. Tide Electrical Co., Ltd., 34/36 High St., Southall, Middx.

Nutradip. 686,016. Class 17. Coating compositions of plastic for insulating purposes. Tanks and Linings, Ltd., Town Wharf, Hanbury Rd., Droitwich.

Raylect. 697,027. Class 9. Electrical apparatus for operating model trains by current control. Raylecto (Penge) Ltd., 75 Elmers End Rd., S.E.20.

Swing. B698,408. Class 20. Electrically driven rotating turntables for the display of goods. Stanley Rogers and Son, Ltd., 119 High Holborn, W.C.1.

MEETINGS TO NOTE

THURSDAY, OCT. 25

I.E.S. (Bradford Group).—"Application of Modern Flash Discharge Tubes." C. R. Bicknell. Y.E.B., Sunbridge Rd., 7.30 p.m.

PURCH. OFFICERS ASSOC. (Yorks Branch).—"Responsibility of the Buyer in Industry." Gt. Northern Hotel, Leeds, 7 p.m.

I.E.E. (London Utilisation Section).—Chairman's address by A. H. Young. Savoy Place, 5.30 p.m.

I.E.E. (Scottish Centre).—"Lightning." Prof. F. M. Bruce, District meeting at Temperance Hotel, Lint Riggs, Falkirk, 7.15 p.m.

I.E.E. (Western Supply Group.)—Chairman's address by E. N. Evans. Electricity House, Colston Ave., Bristol, 6 p.m.

MONDAY, OCT. 29

WOMEN'S ENGRNG. SOC. (Manchester Branch).—"Some New Materials and their Application." R. F. Archer. Engrs. Club, Albert Sq., 6.30 p.m.

I.E.S. (Leeds Centre).—"Festival Year in Britain." T. O. Freeth. L.S.B., Aire St., 7 p.m.

I.E.E. (London Radio Section).—Discussion on "Social Implications of TV," opened by F. H. Townsend. Savoy Place, 5.30 p.m.

A.S.E.E. (Bournemouth Branch).—Film Show at Grand Hotel, Firvale Rd., 8.15 p.m.

TUESDAY, OCT. 30

I.E.E. (N. Midland Centre).—"Control of Hydro-Electric Plant." A. C. H. Frost and W. Brittlebank. Royal Station Hotel, York, 7 p.m.

SOC. OF INSTRUMENT TECHNOLOGY.—President's address: "Development of Materials for Instrument Manufacture." E. B. Moss. Royal Soc. of Tropical Medicine, Portland Place, 6.30 p.m.

WEDNESDAY, OCT. 31

I.E.E. (London Supply Section).—Chairman's address by R. Davis. Savoy Place, 5.30 p.m.

A.S.E.E. (Kent Branch).—Film show at Sun Hotel, Chatham, 8 p.m. (Date changed from Oct. 25.)

THURSDAY, NOV. 1

A.S.E.E. (S. London Branch).—"Fluorescent Lighting". H. Windebank. Cafe Royal, North End, Croydon, 8 p.m.

I.E.E. (E. Midland Centre).—Dinner dance at George Hotel, Kettering, 8 p.m.

I.E.S. (Leicester Centre).—"Lighting ffor Schools." J. F. Roper. E. Midland Elect. Board, Charles St., 6.30 p.m.

I.E.S. (Nottingham Centre).—"Modern Airport Lighting." J. W. Morse. E. Midland Elect. Board, Smithy Row, 5.30 p.m.

I.E.S. (Exeter Group).—Ladies informal evening.

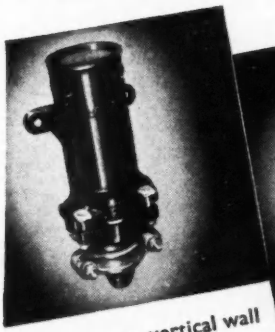
FRIDAY, NOV. 2

I.E.S. (Bath and Bristol Centre).—Ladies informal evening.

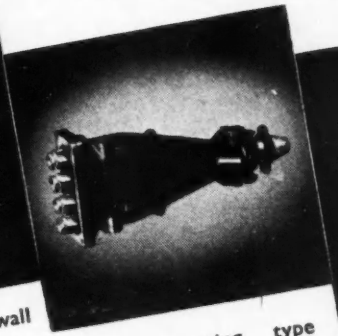
I.E.S. (Stoke-on-Trent Group).—"Stage Lighting." E. Faraday. 31 Kingsway, 6 p.m.

E.I.B.A. (Sussex Branch).—Annual dance at Assembly Hall, Worthing.

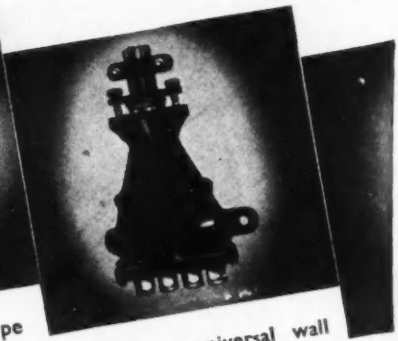
MANCHESTER ASSOC. OF ENGRS.—"Modern Methods of Sound Reproduction." J. R. G. Vernon. Engineers Club, Albert Sq., 6.45 p.m.



Circular type, vertical wall mounting, for single core cable.



Flange mounting type (horizontal or inverted) for twin, 3 and 4-core cables.

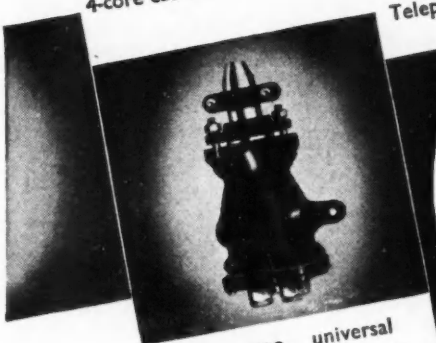


Flat type, universal wall mounting, for twin, 3 and 4-core cables.

Flat type, vertical wall mounting for twin, 3 and 4-core cables.

Circular type, vertical wall mounting, for 3 and 4-core cables, and Signal, Pilot or Telephone Cables.

Flange mounting type (vertical) for twin, 3 and 4-core cables.



Circular type, universal wall mounting, for 3 and 4-core cables.

There's a HENLEY Indoor Terminal Box to suit every normal requirement, for working pressures up to 660 V. Please write for Catalogue 35.

HENLEY

TERMINAL BOXES

W. T. Henley's Telegraph Works Co. Ltd., 51/53 Hatton Garden, London, E.C.1.

REMEMBER GENEROUSLY
SAT • NOV 10

WESTON
Electrical Measuring Instruments

No. 1 Laboratory Instruments

The experience gained from over 60 years in the design and manufacture of precision instruments is embodied in Weston Laboratory Standards. Endless care in the selection and ageing of materials and in the assembly and calibration of the instruments ensures the maintenance of the extremely high accuracy of 0·1%. Features include 12" Vernier Scale, magnetic shielding and self-contained thermometer. Full details of these instruments and of the full Weston range of switchboard, panel, first grade and sub-standard instruments are available on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex — *Grams: Sanwest, Enfield*

Tel: Enfield 3434 (6 lines) and 1242 (4 lines)

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton & Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

GOVERNMENT OF CEYLON

CEYLON HYDRO-ELECTRIC SCHEME, STAGE IIA—25,000 kW

TENDERS. Amended Notice. The Government of Ceylon will call for tenders shortly for the construction of Stage IIA of the Hydro-Electric Scheme at Watawala.

Under Stage IIA a seasonal storage reservoir will be provided by the construction of a mass concrete dam, 730 feet long, 130 feet high, near Castlereagh about 5 miles upstream from the existing Norton Dam, so that the stored water can be released under control.

Two further pipelines about 5,444 feet long will be provided. Each pipe will be 48 inches diameter at the head diminishing in diameter to 36 inches at the terminal anchor blocks where the two 36 inch pipes will bifurcate into two to form three 33 inch pipes connecting to the turbine inlet valves.

The electrical and mechanical plant is to be erected in an extension to the existing Laksapana Power House near Watawala and in substations at Nuwara Eliya, Kurunegala and Colombo; they include three waterwheels for direct coupling to three 12,500 kW alternators which latter should also be supplied, self-closing valves; 66 kV, 11 kV and 400 V a.c. switchgear together with control gear and cables for power house; 66 kV, 33 kV and 400 V switchgear and oil purifiers for substations and the receiving station; transformers, arc suppression and de-coupler coils, voltage boosters, lightning arrestors, fire-fighting equipment, etc.

A 66 kV transmission line with steel towers and cadmium copper conductors about 18 miles long will be erected from Norton to Nuwara Eliya and another about 18 miles long from Peradeniya to Kurunegala and a third about 52 miles long from Laksapana to Colombo.

The work enumerated above will be carried out in four sections, namely:—

Section A—Mass Concrete Dam at Castlereagh.

Section B—Pipelines.

Section C—Electrical and Mechanical Plant.

Section D—Transmission Lines.

Separate tenders will be invited for each of the four sections. A Memorandum setting out further details of the work involved will be issued to prospective tenderers on application to the Crown Agents for the Colonies, 4 Millbank, London S.W.1. Firms which propose to tender for one or more sections of the work should apply to the Chief Engineer and Manager, Department of Government Electrical Undertakings, Ceylon, through the Crown Agents for the Colonies, 4 Millbank, London S.W.1, on or before November 21, 1951, setting out their experience, resources, etc. The capability of these firms to undertake the work will be examined by a Board constituted for the purpose and such firms as are considered satisfactory will be requested to tender. (N 147)

OXFORDSHIRE COUNTY COUNCIL

PROPOSED SECONDARY MODERN SCHOOL, WITNEY

TENDERS are invited for the ELECTRICAL INSTALLATION of this school and applications from electrical contractors desirous of tendering should reach me not later than Thursday, November 1, 1951.

Specifications, schedules, lay-out and forms of tender will be issued for return by Wednesday, December 5, 1951.

The County Council reserves the right to select from the list of applications the firms to be invited to submit competitive tenders and does not bind itself to accept the lowest or any tender submitted.

G.R. HUTTON, F.R.I.B.A., F.R.I.C.S.,
County Architect.

3 Becket Street,
Oxford.
October 16, 1951. (N 232)

CITY OF PETERBOROUGH

THE Council invites tenders from recognised electrical contractors for the ELECTRIC LIGHTING and POWER INSTALLATIONS to 14 shops, branch library, 16 flats and 14 garages and stores on the Dogsthorpe Estate, Peterborough.

Drawings, specifications and forms of tender may be obtained on application to Mr. F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications before noon on November 3, 1951, should be accompanied by a cheque to the value of £2 2s. made payable to the Peterborough City Council, which will be returned on receipt of a bonafide tender or the return of the documents.

Tenders are to be enclosed in the envelopes provided and endorsed "Electrical Installation, Shops and Flats, Dogsthorpe Estate."

The Authority does not bind itself to accept the lowest or any tender.

C. PETER CLARKE,
Town Clerk.

Town Hall,
Peterborough.
October, 1951. (N 221)

CITY OF BELFAST

ELECTRICITY DEPARTMENT

LOW PRESSURE VALVES AND/OR PENSTOCKS, AND ROAD TRANSPORT WEIGHBRIDGE, VICTORIA POWER STATION

TENDERS are invited for the supply, delivery and erection of:

(1) LOW PRESSURE VALVES AND/OR PENSTOCKS (Form No. 1156).
Section "A" Two 48-in. bore and two 72-in. bore motor-operated sluice valves for installation in the condenser circulating water culverts, the valves to be complete with cast iron specials for installing in reinforced concrete culverts and 6- and 4-in. bore drain and air release valves.
Section "B" Seven penstocks 5 ft wide by 10 ft high, three penstocks 3 ft wide by 13 ft high, and one penstock 6 ft wide by 13 ft high. These penstocks shall be motor operated with emergency hand operating gear.

(NOTE. Tenders are required for the whole of the above work, but each section will be considered independently, and tenderers may quote for either Section "A" or Section "B" or both. The Corporation will consider only offers for the whole of the plant specified in each section.)

(2) ROAD TRANSPORT WEIGHBRIDGE (Form No. 1055).
One road transport weighbridge capable of weighing gross loads up to 30 tons, complete with indicating and ticket printing recording equipment.

Forms of tender, conditions and specifications, in quadruplicate, may be obtained from Messrs. Merz and McLellan, consulting engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of 5 gns. in respect of each of items (1) and (2) (cheques to be made payable to the Belfast Corporation Electricity Department), which will be refunded provided bonafide tenders be lodged and not withdrawn. Extra copies of the contract documents may be obtained at 3 gns. per set; this sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope marked "Tender for . . ., Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, November 23, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall Belfast.
October 19, 1951. (N 235)

APPOINTMENTS VACANT

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 7 (Grimsby) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
(Scunthorpe) Vacancy No. 134/51

Applicants should have had a sound practical training and experience in the operation, maintenance and construction of underground and overhead networks.

Preference will be given to candidates who hold certificates in electrical engineering.

Salary, N.J.B. Agreement, Class "E," Grade 7, £629 to £660 per annum.

THIRD ASSISTANT ENGINEER (CONSTRUCTION)
Vacancy No. 134/51

Applicants should have had a sound practical training and experience in the operation, maintenance, planning and construction of high and low voltage underground and overhead networks, substation plant, and ancillary apparatus.

Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers, or who hold certificates in electrical engineering.

Salary, N.J.B. Agreement, Class "G," Grade 10, £588 to £610 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (N 207)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of JUNIOR ENGINEER in the Chief Testing Engineer's Department at Meaford "A" Generating Station.

The salary for this appointment will be in accordance with Class "G," Grade 14, of the National Joint Board Agreement, commencing at £453 per annum.

The successful applicant will be required to assist the Instrument Engineer in the efficient maintenance of all types of instruments associated with boilers and turbines, other than purely electrical instruments used in connection with the electrical energy produced or consumed.

In particular, candidates should have had experience in the operation and maintenance of Baily Automatic Boiler Control equipment, and should possess at least the ordinary National Certificate in electrical or mechanical engineering or equivalent qualification.

Conditions of service will be in accordance with the N.J.B. Agreement and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms obtainable from the Divisional Establishments Officer, 53, Wake Green Road, Moseley, Birmingham 13, and should be returned not later than November 10, 1951.

F. W. LAWTON,
Divisional Controller.
(N 214)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of THIRD ASSISTANT ENGINEER—Metering Section of the Technical Department at Divisional Headquarters, Woolton, Liverpool. Salary £629-£765 per annum, being Class "AX," Grade 5, of the National Joint Board Agreement.

Applicants should possess the Higher National Certificate in Electrical Engineering or equivalent qualification and have had experience in the operation of a Class "A" meter testing department and be fully conversant with the standardisation of instruments, should preferably have had experience in the manufacture of summation metering equipment and/or electrical measuring instruments, and be fully acquainted with the application of metering and electrical instrumentation of power stations and large networks. A knowledge of precision electrical measurements is also desirable.

The appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme, and subject to a medical examination.

Forms of application can be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned not later than Friday, November 9, 1951.

A. R. COOPER,
Divisional Controller.
(N 217)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for positions as JUNIOR ENGINEERS in generating stations in the Southern Division.

The conditions of service are those approved by the National Joint Board for electricity supply industry, the salary scales being within the range £375-£496, the point of entry depending on qualifications, experience, and the size of the station to which appointed.

With the continuing expansion of the industry and the installation of additional generating plant the chances of promotion for suitable candidates are considered to be good.

Applicants should have had a sound general education and an apprenticeship or practical training suitable to the industry. Preference will be given to graduate members of a recognised professional institution or those possessing a university degree or Higher National Certificate.

The duties of those appointed will vary with each station, but will include as a general rule the operation and control, under supervision, of generating plant. Vacancies also exist for those who wish to specialise in the maintenance of instruments, and other electrical and mechanical generating plant. Applicants should be prepared to accept shift duties if called upon to do so.

The appointments are superannuable and subject to a satisfactory medical examination.

Forms of application may be obtained from the undersigned and must be returned not later than November 9, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (N 219)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Northmet Sub-Area :

Sub-Area Construction Section, Friern Barnet Road, London, N.11 112/51R

THIRD ASSISTANT ENGINEER

The duties of the post include the large-scale organisation and control of the laying, jointing, fault locating, repair and maintenance of underground cables up to 33 kV in a densely populated area by direct and contract labour. Corporate Membership of the Institution of Electrical Engineers will be an advantage.

The salary for the appointment will be in accordance with Class "M," Grade 10, of the National Joint Board Salary Agreement, commencing at £783 p.a., plus London Weighting.

Apply to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14.

Wembley District 113/51R

SECOND ASSISTANT ENGINEER

Candidates should have had a sound technical training and experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems.

The salary for the appointment will be in accordance with Class "F," Grade 7, of the National Joint Board Salary Agreement, commencing at £677 per annum plus London Weighting.

Apply to the District Manager, Wembley, Eastern Electricity Board, 427, High Road, Wembley, Middx.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary should be submitted to the Manager concerned within fourteen days of the appearance of this advertisement. (N 211)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF THIRD ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)—SUB-AREA HEADQUARTERS, OLDHAM

APPLICANTS should be experienced in operation and maintenance of large industrial and rural h.v. and l.v. networks, o/h lines and u/g cables up to 33 kV, and h.v. testing and fault localising.

Graduate membership of the Institution of Electrical Engineers or exempting qualifications preferred.

Salary scale: £699 to £728 p.a., Grade "K.10," N.J.B. conditions.

Applications to Sub-Area Manager, No. 3 Sub-Area, The North Western Electricity Board, Union Street, Oldham, by November 3, 1951. (N 205)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

SECOND ASSISTANT STATION CHEMIST
DUNSTON POWER STATION

APPLICATIONS are invited for the appointment of Second Assistant Station Chemist at Dunston Power Station.

Applicants should have had experience in modern power station laboratories covering the analysis of fuel water and oil and be conversant with water treatment and fuel sampling. A University Degree in Chemistry or A.R.I.C. is preferable but candidates with a Higher National Certificate in Chemistry followed by a recognised course of study will be considered.

The salary for this appointment will be in accordance with the National Joint Board Schedule "A," Grade 11, Class "K" (£658-£683 per annum).

Superannuation will be in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne, to whom they should be returned to arrive not later than November 7, 1951. (N 177)

LONDON ELECTRICITY BOARD

ARCHITECTURAL ASSISTANTS,
ARCHITECTURAL DRAUGHTSMEN

APPLICATIONS are invited for the above positions in the Architect's Section of the Chief Engineer's Department in Central London.

Applicants for positions as Architectural Assistants should be studying for or have passed the Intermediate examination of the R.I.B.A., be capable draughtsmen and have had several years' experience in an architect's office.

Applicants for positions as Architectural Draughtsmen should be neat draughtsmen and preferably have had several years' experience in an architect's office.

The posts have been graded under Schedule "D" of the National Joint Board agreement as follows:—

(a) Architectural Assistants—Grade 5, £574/7/- to £633/11/- per annum, inclusive of London Area Allowance.

(b) Architectural Draughtsmen—Grade 6, £438 to £574/7/- per annum, inclusive of London Area Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed and stating grade applied for, by November 10, 1951. Please enclose addressed foolscap envelope and quote ref. V/1256/66/T on all correspondence. (N 126)

BRITISH ELECTRICITY AUTHORITY

London Division

ELECTRICAL MAINTENANCE ENGINEER
DEPTFORD EAST GENERATING STATION

APPLICATIONS are invited for the above position.

Candidates should have had a good all-round electrical engineering experience associated with the maintenance and repair of e.h.t. switchgear, transformers, switchboards, motor control gear, etc., and in cabling and wiring work. Experience in the preparation of programmes of work, in planning and in the control of men is essential.

Candidates should also have received a sound technical training, preferably of Higher National Certificate standard.

Salary in accordance with N.J.B. Schedule, Class "H," Grade 7, plus London Allowance £784 7s. per annum.

The post is superannuable.

Applications stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(N 218)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of MAINTENANCE ENGINEER (MECHANICAL) at Braehead Power Station.

Experience in high pressure boilers, including pulverised fuel and turbines is essential. The salary will be in accordance with Grade 6, Class "H" of Schedule "A" of the National Joint Board Agreement.

Applications stating age, technical attainments and experience should be forwarded on Form A.E.6 which may be obtained from the Divisional Secretary to whom it should be returned at British Electricity House, 168 Broomhill Drive, Glasgow, W.1.

Applications should be returned within ten days of the appearance of this advertisement.

A. CHRISTIANSON,
Divisional Secretary.
October 18, 1951. (N 220)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

JUNIOR ENGINEER—LUTON GENERATING STATION

Salary in accordance with Clause 35 of the N.J.B. Schedule "A" (revised), Class "E," Grade 15, £375, or Grade 14, £413 per annum, rising to a maximum of £426 per annum, depending on qualifications.

Applicants should preferably have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent. Previous experience with rotary converting plant and/or in a Generating Station will be an advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than November 2, 1951. Envelopes should be endorsed "Junior Engineer—Luton."

W. N. C. CLINCH,
Controller.
Northmet House,
Southgate, N.14. (N 206)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

JUNIOR ENGINEERS, HINCKLEY AND WARWICK

APPLICATIONS are invited for positions as Junior Engineers at Hinckley and Warwick Generating Stations.

Applicants should have had a sound technical training and experience in power station operation would be an advantage.

Salary will be in accordance with Class "E," Grades 15/14 at Warwick and Class "B," Grade 12 at Hinckley, of the National Joint Board Agreement.

The posts will be superannuable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham and should be returned not later than November 12, 1951.

L. F. JEFFREY,
Divisional Controller.
(N 216)

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

APPOINTMENT OF FIRST ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Solihull District of the Birmingham and District Sub-Area.

Applicants should have had experience in the operation and maintenance of high-voltage and medium-voltage distribution overhead and underground networks and associated switchgear, transformers, and protective systems, appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with National Joint Board conditions, and the salary will be Grade "E5," £715 to £749 per annum.

Applications, stating age, qualifications, present position and full details of experience, should be endorsed "First Assistant District Engineer" and forwarded within 14 days to Emil Braathen, Manager, Birmingham and District Sub-Area, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
October 13, 1951. (N 180)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

DEPUTY POWER STATION SUPERINTENDENT

APPLICATIONS are invited for the position of Deputy Power Station Superintendent at Bonnybridge Power Station, Stirlingshire, on Grade 3, Class "F" of the National Joint Board Agreement revised as at July 1, 1951; salary range £887-£925.

Applicants must have had a technical education and experience in the operation and maintenance of modern steam generating plant. A knowledge of high-tension switchgear is essential.

Salary and conditions of service will be in accordance with the N.J.B. Agreement. The post is superannuable.

Applications, stating age and experience, should be submitted to the undersigned by November 3, 1951.

J. F. FIELD,
Divisional Controller.
British Electricity House,
Portobello, Midlothian. (N 202)

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

APPOINTMENT OF DISTRICT MANAGER

APPLICATIONS are invited for the position of District Manager in the Sutton Coldfield District of the Birmingham and District Sub-Area.

Applicants should have had a wide engineering and commercial experience in the electricity supply industry, and preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

The salary, provisionally £1,025 per annum, and the conditions of employment will be subject to negotiations with such body as may be appropriate.

Applications, stating age, qualifications, experience, present position and salary, endorsed "District Manager," should be forwarded within 14 days to Emil Braathen, Manager, Birmingham and District Sub-Area, Midlands Electricity Board, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.

October 16, 1951. (N 178)

CROWN AGENTS FOR THE COLONIES

ASSISTANT MECHANICAL ENGINEER required by the Zanzibar Government for one tour of 24 to 36 months in the first instance, with prospect of permanency. Salary according to qualifications and experience in the scale £655 rising to £1,005 a year. In addition a temporary allowance of 10 per cent. of salary is at present payable. Outfit allowance, £30. Free passages. Liberal leave on full salary. Candidates (under 40 years) must have served an apprenticeship to mechanical engineering and have had practical experience in the operation, maintenance and overhaul of large Diesel engine generating plant, 11 kV oil-immersed switchgear and auxiliary power station equipment. They should hold the National Certificate in Mechanical Engineering or one equivalent qualification.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.25313B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (N 179)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the Islington District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, preferably being Corporate Members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a district distribution department, particularly in regard to mains and sub-station work on both single- and three-phase systems.

The post is graded under Schedule A of the National Joint Board agreement (February 17, 1950) as Class "E," Grade 7—£660 9s. per annum rising to £693 per annum, inclusive of London Area Allowance.

Application forms obtainable from Establishments Officer, 46, New Broad Street, E.C.2, to be returned duly completed by November 10, 1951. Please enclose addressed foolscap envelope and quote reference V/1344/T on all correspondence. (N 213)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT SHIFT CHARGE ENGINEER at Littlebrook Power Station. Applicants should have technical qualifications equivalent to Graduate Membership of either the Institute of Mechanical or Electrical Engineers and should have had responsible experience of the operation of modern high pressure power station plant. A good knowledge of the efficient operation of boiler and turbine plant is essential. Preference will be given to those with p.f. experience. Class "J," Grade 9, £733 19s. per annum including London Allowance. N.J.B. conditions of service. Applications on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-upon-Thames, to be returned by November 3, 1951. (N 227)

KENT EDUCATION COMMITTEE

MAIDSTONE TECHNICAL COLLEGE,
TONBRIDGE ROAD, MAIDSTONE

LABORATORY ASSISTANT required mainly for work in electrical and mechanical engineering laboratories. Salary according to age on scale, rising to a maximum of £425 at 30 years of age. City and Guilds or National Certificate qualifications preferred. Apply to the Principal, stating fully, qualifications and experience. (N 201)

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

APPOINTMENT OF GENERAL ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Severn Vale District of the Central Gloucestershire Sub-Area.

Applicants should have had experience in all branches of distribution work, including operation and maintenance of high and low voltage cables and overhead lines, sub-stations, etc. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and the salary will be in Class "D," Grade 10, £511 per annum.

Applications in writing, giving age, full particulars of experience, present salary and position, and quoting Ref. T/122, should be forwarded to Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.

October 13, 1951. (N 181)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 590

APPLICATIONS are invited for the position of DRAUGHTSMAN on the staff of No. 3 Sub Division, and will be based at Barton Generating Station, Urmston, near Manchester.

The salary for the position, which is superannuable, will be in accordance with Schedule "D" of the N.J.B. Agreement as revised on 1/7/51, and will be within the range of £413-£547 per annum, in accordance with Grade 6.

Applicants should have had a good technical education, and possession of a Higher National Certificate (preferably Mechanical Engineering) is desirable.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than November 3, 1951. (N 215)

LONDON ELECTRICITY BOARD

ENGINEER (CONSTRUCTION)

APPLICATIONS are invited for the above position in the Construction Branch of the Chief Engineer's Department at Lesco House, Stamford Street, London, S.E.1.

Applicants are required to have considerable experience in the design and detailing of a wide variety of reinforced concrete structures and also of structural and building work in general. Preference will be given to fully qualified structural engineers.

The post is graded under Schedule C of the National Joint Board agreement (February 17, 1950) as Grade 5. Salary range: £607 19s. to £814 16s. per annum inclusive. The commencing salary will be dependent upon qualifications and experience.

Application forms, obtainable from Establishments Officer, 46, New Broad Street, E.C.2, to be returned duly completed within 10 days. Please enclose addressed foolscap envelope and quote reference EST/V/1228/T on all correspondence. (N 233)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of STATION CHEMIST at Cardiff Power Station, at a salary in accordance with the revised National Joint Board Agreement, Class "F," Grade 7 (£677-£696 per annum).

Applicants should preferably possess a B.Sc. degree, be associate members of the Royal Institute of Chemistry or have obtained an equivalent qualification and should have had sound experience in water treatment chemistry and coal and oil testing.

The appointment will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed forms should be returned not later than November 17, 1951.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.

H. V. PUGH,
Divisional Controller.

October 15, 1951. (N 226)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of ASSISTANT SHIFT CHARGE ENGINEER at Dalmarnock Generating Station.

The salary will be within the range £699 to £728 per annum, this being in Class "J," Grace 9, of Schedule A of the National Joint Board Agreement.

Applications, stating age, qualifications and experience, should be forwarded on Form A.E.6, which may be obtained from the Divisional Secretary, to whom it should be returned at British Electricity House, 168 Broomhill Drive, Glasgow, W.1.

Applications should be returned within ten days of the appearance of this advertisement.

A. CHRISTIANSON,
Divisional Secretary.

October 17, 1951. (N 212)

BRITISH ELECTRICITY AUTHORITY

North Western Division

INVITE applications for the following superannuable post: ASSISTANT MAINTENANCE ENGINEER (Mechanical), at Kearsley Generating Station, Stoneclough, near Manchester.

The salary will be £787/£823 per annum, in accordance with Grade 6, Class "K" of the N.J.B. Agreement, as revised at 1.7.51.

Candidates should have had a good technical training with wide experience in power station mechanical maintenance.

Applications quoting vacancy number 587, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than October 31, 1951. (N 176)

AIR MINISTRY require MECHANICAL and ELECTRICAL ENGINEERS for duty in their Works Department in connection with the design, operation and maintenance of ground mechanical and electrical works services on R.A.F. stations at home and overseas and on Civil Aviation stations. Appointments will be in two grades with a salary of (1) £600-£900 (D 19/48/A) or (2) £900-£1,200 (D 370/50/A) respectively. Provincial rates are somewhat lower. Commencing salary will be in accordance with age, qualifications and experience. A special allowance of up to £800 a year is payable in addition to salary during overseas service. Candidates must be natural born British subjects. The minimum qualifications and experience required for both grades of post are: (i) (a) University degree or equivalent diploma in electrical and/or mechanical engineering and have had at least a two-year apprenticeship, or (b) Graduate or corporate membership of the Institution of Electrical Engineers, or of the Institution of Mechanical Engineers with appreciable electrical engineering experience, and have served at least a three-year apprenticeship, and (ii) have been employed in a responsible position for a minimum of three years with a well-established engineering concern, and there have gained wide experience in electrical and mechanical engineering practice.—Application forms from Ministry of Labour and National Service, Technical and Scientific Register, (K), Almack House, 26 King Street, London, S.W.1. Quoting D 19/48-A or D 370/50-A. Closing date November 9, 1951. (N 231)

APPLICATIONS are invited from ELECTRICAL CONTRACTS ENGINEERS for handling orders for steel works installations and other metal industries projects, both as respects power units and associated control schemes. Preference will be given to applicants between 25 and 35 years of age who have served recognised apprenticeship, hold at least Higher National Certificate and have had previous manufacturing contractual experience. Permanent progressive positions, pension scheme. Successful applicants will have to find own accommodation, but for a limited period arrangements will, in appropriate cases, be made for special financial assistance.—Apply, stating age, qualifications, experience and quoting Ref. 488B, to Central Personnel Services English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (N 138)

ASSISTANT ELECTRICAL ENGINEER required for Construction Project in Kent. Must be versatile, active, age not over 40. Technical Education to Higher National Certificate desirable. Practical experience in Lighting and Power installations, cables, motor and switch gear assemblies. Knowledge of flame-proof installations an advantage.—Apply in writing to Geo. Wimpey and Co. Ltd., Dept. 1, Hammersmith Grove, London, W.6. (N 228)

ASSISTANT ENGINEER required with experience of cable installation work, estimating and taking off quantities.—Write in confidence, stating qualifications, experience and salary required, to Cable Dept., Edison Swan Electric Co., Ltd., 155 Charing Cross Road, London, W.C.2. (N 238)

ASSISTANT TECHNICAL SECRETARY wanted for electric transmission and utilisation studies. Preferably Grad. I.E.E. with some experience in the electrical supply industry. Starting salary in the range £350-£500 p.a. according to age and experience.—Applications should be addressed to the Director, The Electrical Research Association, 5 Wadsworth Road, Greenford, Middlesex. (N 225)

COMMERCIAL MANAGER required by a London firm of electrical contractors associated with large combine carrying out important power and lighting contracts. Applicants with both commercial and engineering experience preferred. Good salary to right man. Staff pension scheme.—Applications, with references, treated in confidence.—Box No. 1153, Electrical Times. (N 183)

COMPANY manufacturing diesel electric locomotives will accept applications for the following staff: DESIGN ENGINEERS and DESIGN DRAUGHTSMEN. Highly specialised in electrical and mechanical design and manufacturing procedure of d.c. traction generators, traction motors and control equipment. Also Draughtsmen experienced on similar work. Good salaries paid to men of first-class experience. Three years agreement. Every facility to find suitable accommodation will be given. Offers only to first-class men.—Box No. 1143, Electrical Times. (N 167)

DESIGN DRAUGHTSMAN required for interesting work on small mass produced electro-mechanical devices. Progressive post.—Write full details of experience and salary required to Box No. 1159, Electrical Times. (N 222)

DRAUGHTSMAN/SURVEYOR required. Applicants should be experienced in surveying, profiling, and the maintenance of mains records. Salary and conditions of service will be in accordance with the National Joint Council, Grade 2, £440-£500 per annum.—Applications stating age, education and experience should be forwarded within 14 days to, District Manager, Midlands Electricity Board, Stourbridge Road, Bromsgrove. (N 224)

DRAUGHTSMEN and DESIGNERS with good experience in the light mechanical or radio engineering fields are required for work at Stanmore and Wembley.—Applications, giving details of age and record should be sent to the Staff Manager (Ref. GBLC/151), Research Laboratories of the General Electric Co., Ltd., East Lane, North Wembley, Middlesex. (N 173)

DRAUGHTSMAN required for Contracts Section, experienced on flat back and cubicle type switchgear and able to do diagrams. Good salary offered for suitably qualified applicant. Pension scheme available. Reply, stating age, salary, and full details of technical qualifications and experience to Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (N 237)

DRAUGHTSMEN required, preferably with experience in any branch of high-tension and low-tension electrical switchgear, switchboard layout, and diagrams of connections, or electrical control gear. Applications from good mechanical draughtsmen and designers are also invited.—Apply, quoting "Switchgear" and stating age, experience and salary required, to the General Electric Co., Ltd., Engineering Works, Witton, Birmingham 6. (N 127)

ELECTRICAL ENGINEER, age 20-25, required for editorial staff of old established technical journal. Previous journalistic experience unnecessary, but must be fully qualified engineer. Superannuated position. State salary required.—Box No. 1141, Electrical Times. (N 165)

ELECTRICAL ENGINEER required by British Insulated Callender's Cables Ltd., for the technical development of electro static capacitors at their Helsby works. Permanent position with superannuation and bonus schemes after 12 months' probationary service.—Applications, giving details of qualifications and experience, should be made, in writing, to The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. (N 223)

ELECTRICAL TRANSFORMER DESIGNER required with experience of transformer design up to 500 kVA. Able to take full responsibility.—Apply, giving full details of experience and salary anticipated, to Woden Transformer Co. Ltd., Moxley Road, Bilston, Staffs. Tel. 41959. (N 236)

ESTABLISHED and progressive electrical business in North West London wishes to extend its present contracts department. Capital, stores, clerical and staff available, only requiring an experienced CONTRACTS MANAGER capable of introducing new business. Man with existing business or connection would receive preference. Excellent opportunity.—Box No. 1157, Electrical Times. (N 185)

ESTIMATING CLERK (male) required. Experienced in pricing of bills of quantities and material control of electrical contracts. Salary £150 to £430, according to age and experience.—Apply in writing, District Manager, Midlands Electricity Board, Southwood, Lypiatt Road, Cheltenham, Glos. (N 186)

ELECTRICAL STOREKEEPER required with shop fitting experience.—Write, giving age and particulars to Box No. 1149, Electrical Times. (N 171)

FERRANTI LTD., Hollinwood Works, Manchester, have a vacancy in their Power Engineering Department for an ENGINEER to take charge of development work associated with the manufacture of power transformers of all sizes up to 500,000 V and 250,000 kVA, including all ancillary apparatus such as automatic voltage regulation and thermal control. The work includes the study of thermal, electromagnetic, and constructional problems and their application. The candidate should have a good degree and extensive experience in charge of development, preferably in an engineering manufacturing organisation, but not necessarily on transformers. The position is one that carries excellent prospects. Commencing salary, according to qualifications and experience, in the range of £1,000 to £1,500. Pension scheme.—Application forms from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote reference T.D. (N 123)

IMPERIAL CHEMICAL INDUSTRIES LTD., Plastics Division, requires an ELECTRICAL DRAUGHTSMAN with varied experience in design of factory layouts, works and office lighting installations, power and heating control problems. Appointment will be to the Engineering Department at Welwyn Garden City. Staff pension fund. Five-day, 39-hour week.—Write for application form to Staff Manager, I.C.I. Ltd., Plastics Division, Welwyn Garden City, Herts. (N 189)

JOHNSON AND PHILLIPS LTD. require JUNIOR TRANSFORMER ESTIMATOR and TECHNICAL CORRESPONDENT, aged 22 to 25. Experience of transformer manufacture essential supplemented by technical training.—Applications, in writing, giving particulars of age, training, experience and salary required, to Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, London S.E.7. (N 115)

JOHNSON AND PHILLIPS LTD.—Switchgear Works in Johannesburg, South Africa. SENIOR SWITCHGEAR DESIGN and DEVELOPMENT DRAUGHTSMAN required for power station and control gear ranging from medium to high voltage (11 kV). Only experienced men, not above 35 years of age, need apply.—Reply, stating age, salary and experience, to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (N 116)

LAMINATED Insulation Manufacturer requires TECHNICIAN for responsible position involving Process supervision and development work on manufacture of Bakelised Paper Bushing insulators. Previous experience in insulation manufacture desirable.—Apply, Permali, Ltd., Bristol Road, Gloucester, stating age, qualifications and salary required. (N 93)

MALES. TESTERS FOR ELECTRICAL MEASURING INSTRUMENTS. Experience desired but not essential. Good opportunities for young men with required electrical qualifications.—Write for interview, stating age and previous experience: Sangamo Weston Ltd., Cambridge Road, Enfield, Middlesex. (N 187)

QUALIFIED SENIOR LABORATORY ASSISTANT for non-routine testing and development work with a wide range of domestic electric appliances and fittings. Must be conversant with engineering specifications and regulations. Technical training to H.N.C. standard. Dudley area. Excellent opportunity for progressive worker. Salary approximately £500 per annum, according to qualifications.—Full details of age, experience and salary required to Box No. 1155, Electrical Times. (N 184)

REQUIRED by old established engineering firm in Malaya, fully qualified experienced ELECTRICAL ENGINEER as technical salesman. Sales and commercial experience an advantage, single man preferred, age not over 32. Salary according to age and experience.—Write, Box Z.J.642, Deacon's Advertising, 36 Leadenhall Street, E.C.3. (N229)

SALES ENGINEER required for preparation of motor control gear tenders.—Applications to be made in writing, stating previous training, experience and salary required, marking envelopes "Sales Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (N 190)

SENIOR TECHNICAL ASSISTANT to the Sales Manager is required by Manchester manufacturers whose products are widely employed in the electrical and mechanical industry both home and overseas. Applications are invited from engineers, age about 35, having broad commercial experience in a sales organisation or its equivalent and recognised technical qualifications and practical training. The person appointed will assist in the general supervision and direction of the inside and outside sales staff, liaison with works and research departments, development and marketing of new products and contact with senior executives of purchasers and overseas agents. Substantial initial salary fully commensurate with qualifications and experience, favourable pension scheme and excellent prospects for a man possessing all-round ability, tact and initiative.—Applicants should give full details of education, technical and practical training, commercial experience and order of salary required to Box No. 1135, Electrical Times. (N 128)

STEAM generating plant engineers require ASSISTANT ENGINEERS, aged about 25, for Service Department. The applicant should have B.Sc. or similar qualification. Permanent progressive post. Based London area, but required to travel. Salary from £550 per annum upwards, according to age and qualifications.—Box No. 2624, Electrical Times. (N 182)

TECHNICAL (ELECTRICAL) SALES ASSISTANT required by Pilkington Brothers Ltd., Glass Manufacturers, St. Helens, for their Power Line Insulator Department. Previous sales experience in the electrical industry and ability to handle correspondence essential. Qualifications: preferably H.N.C., but would consider O.N.C. Job will be internal to commence with, but may offer prospects for travelling later. Applications should be addressed to the Chief Personnel Officer, Pilkington Brothers Ltd., St. Helens, Lancashire. (N 188)

WANTED, ELECTRIC CABLE TESTER required for factory at Leigh. Applicants need not have had previous experience but preference will be given to those wishing to train as electrical engineers. Five-day week. —Please apply by letter to Staff Officer, B.I.C.C. Ltd., Leigh, Lancashire, stating age, wage required and qualifications. (N 108)

APPOINTMENTS FILLED

UGANDA ELECTRICITY BOARD

THE Chairman of the Uganda Electricity Board wishes to thank all those who applied for the post of STOREKEEPER CLERK. Over 400 applications were received, and a number of these have been selected for interviews and will be informed of the time and place in due course. It is not possible to notify each unsuccessful candidate individually, and it is hoped applicants' attention will be called to this notice. (N 106)

APPOINTMENTS WANTED

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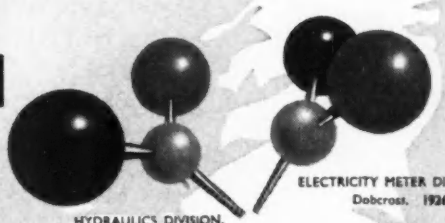

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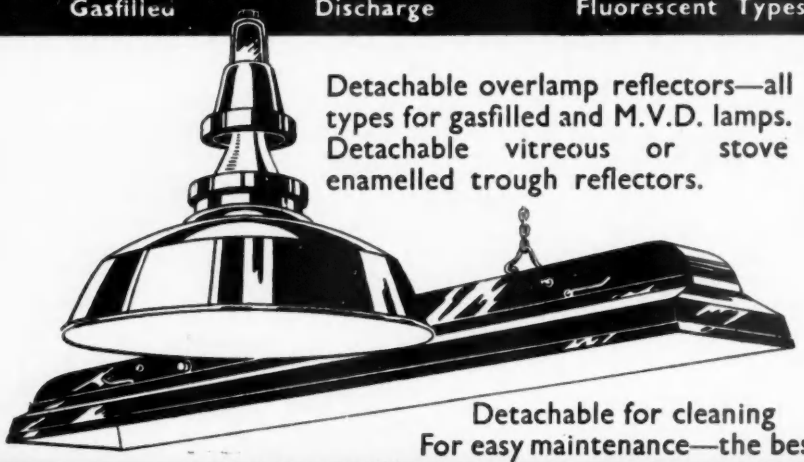

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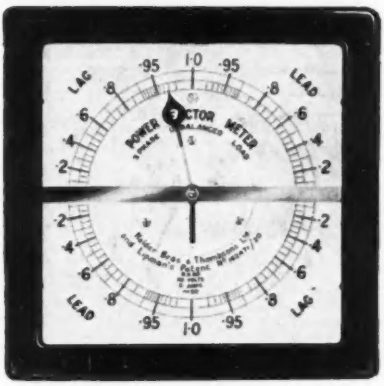

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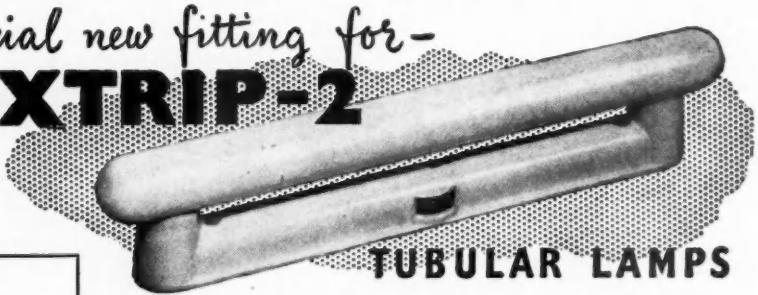

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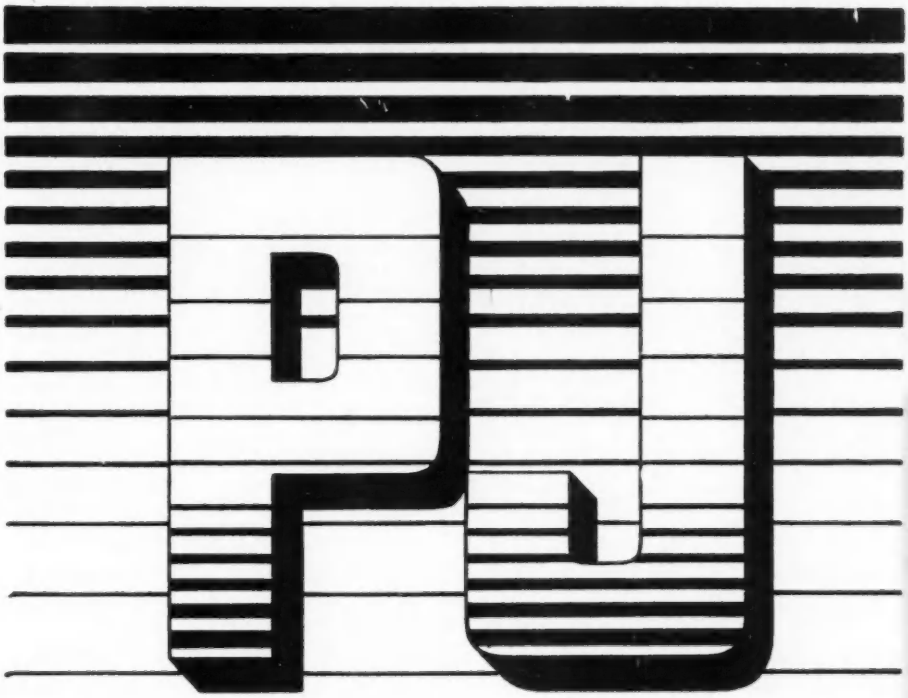

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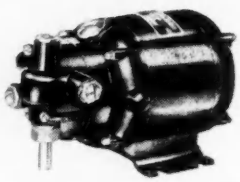

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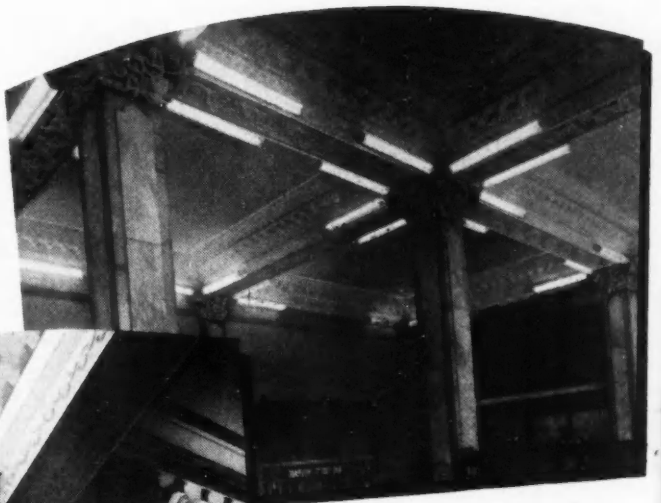

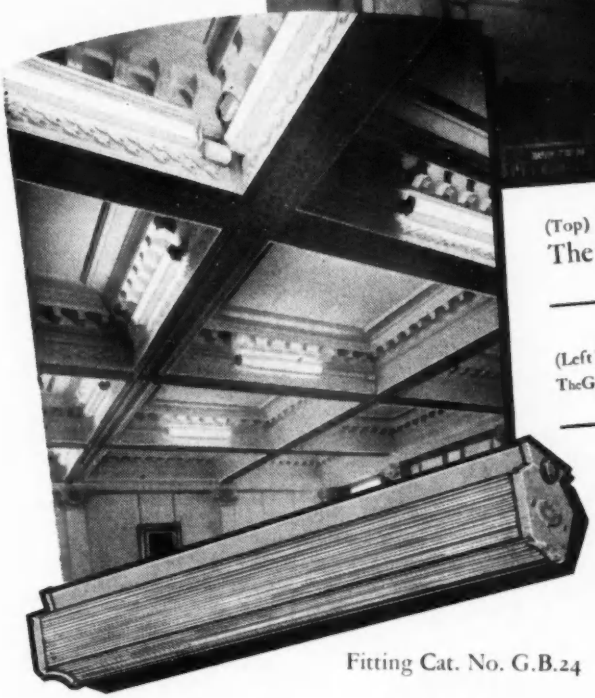

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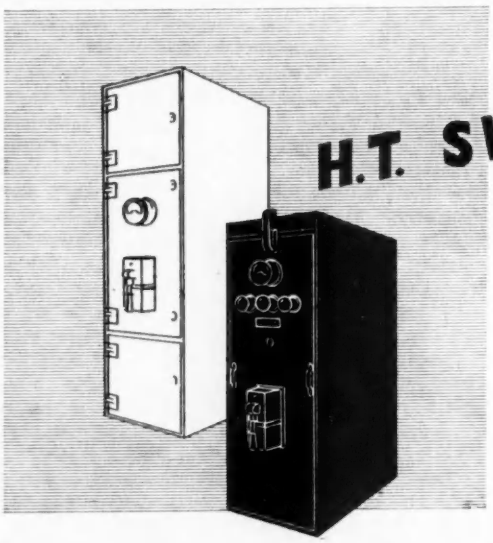

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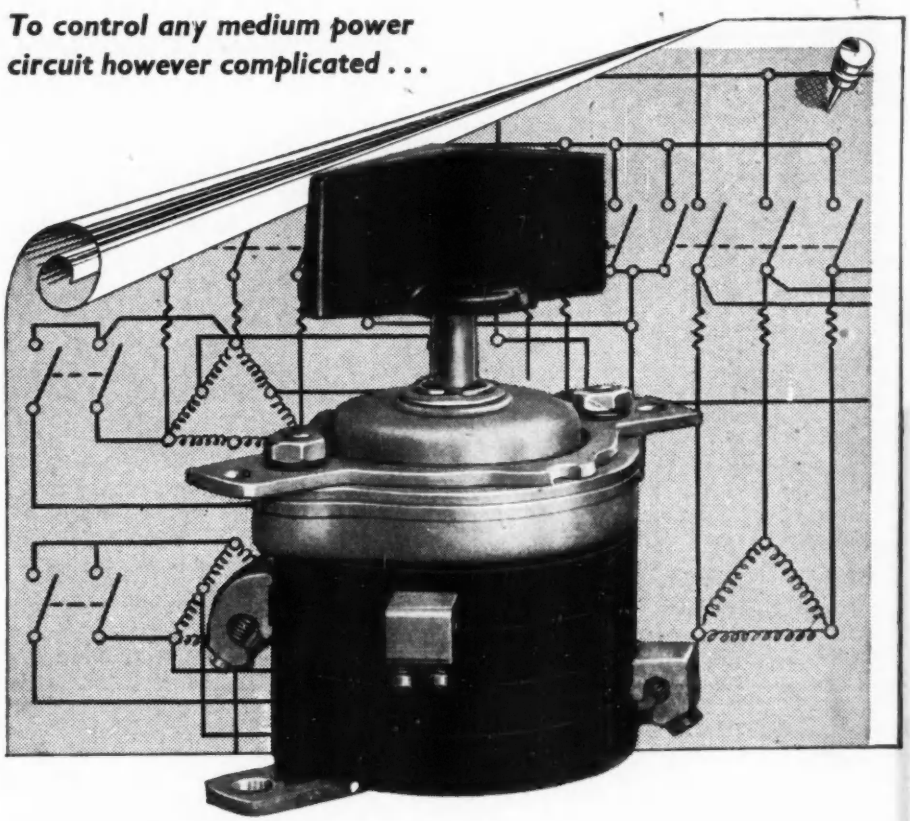

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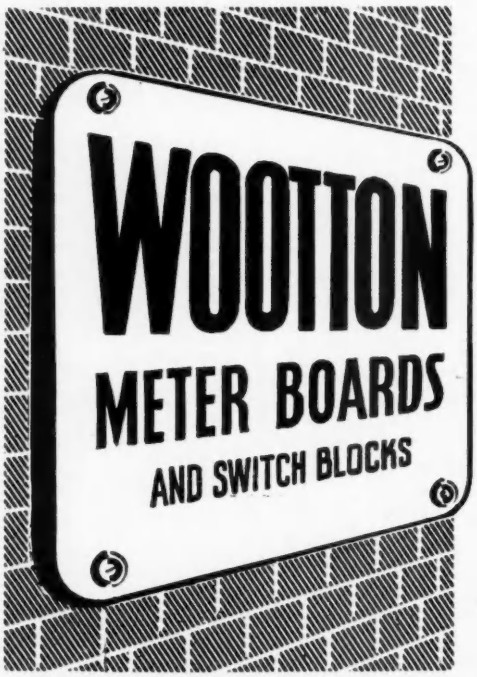

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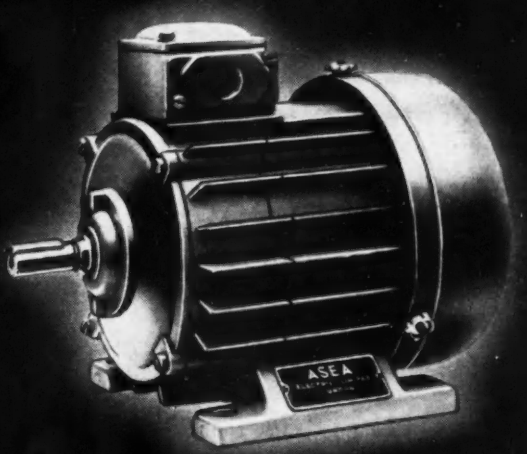

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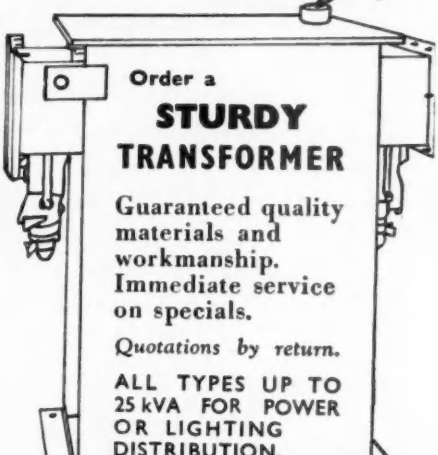

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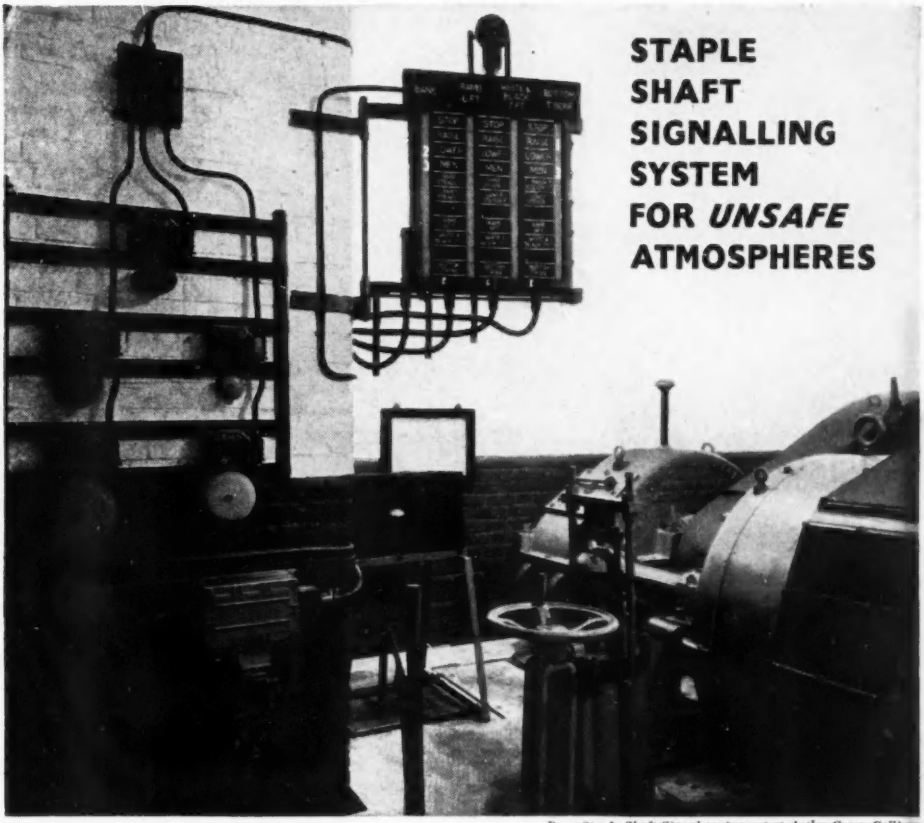

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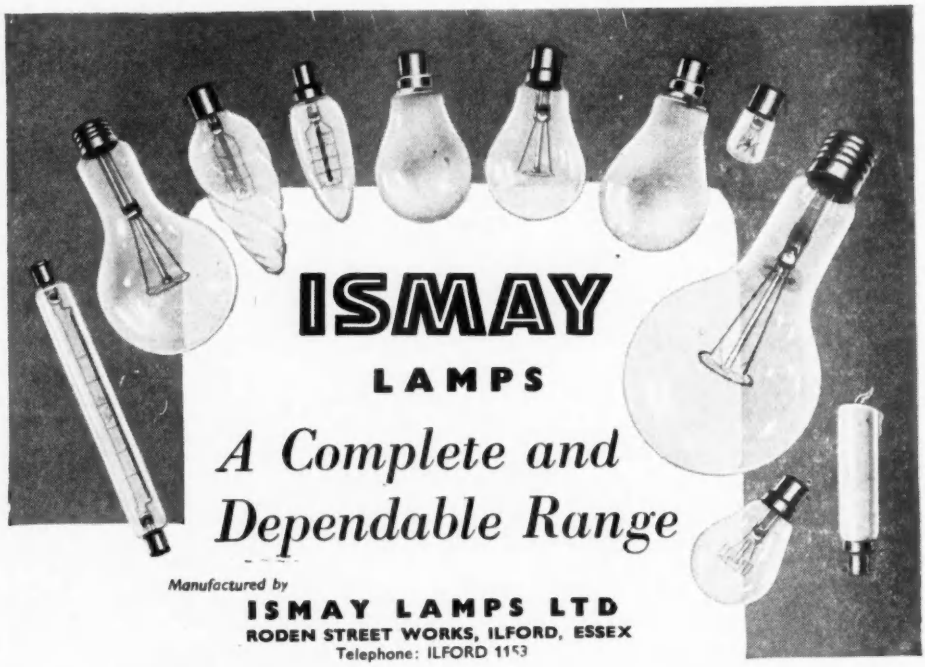

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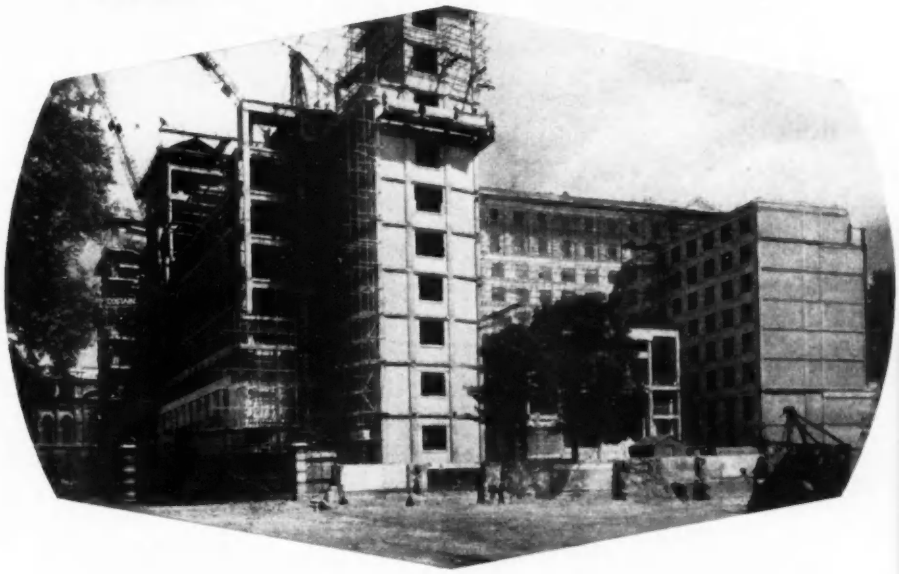

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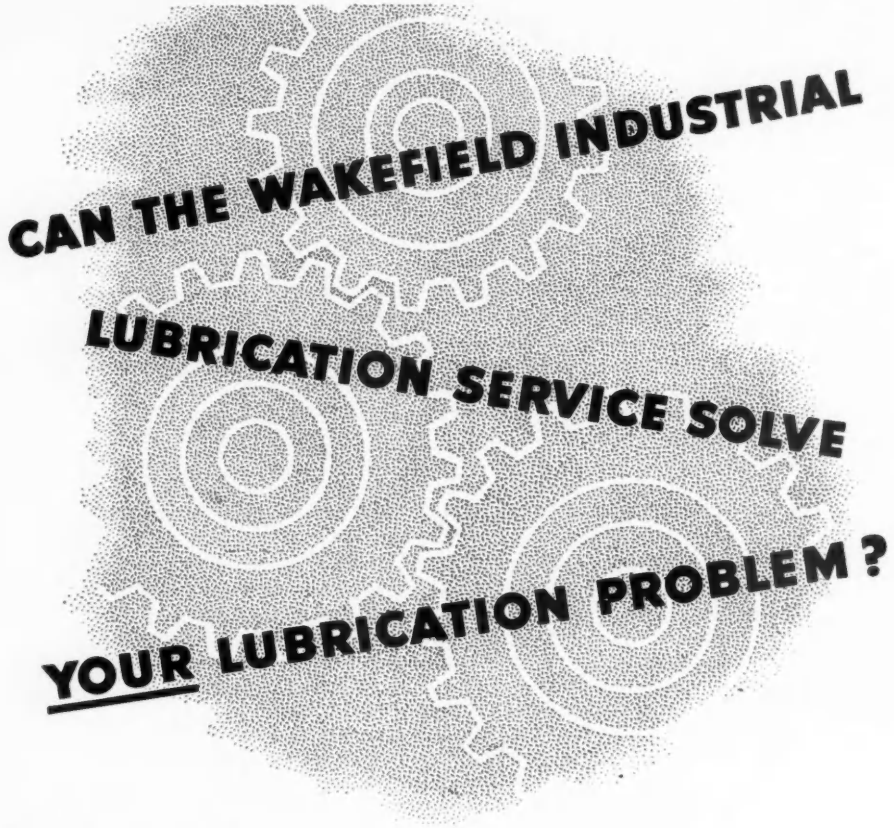

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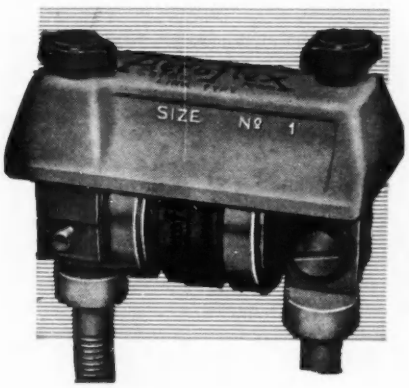

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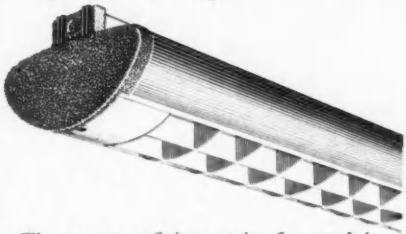

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